

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF AGRICULTURE.

BULLETIN No. 144.

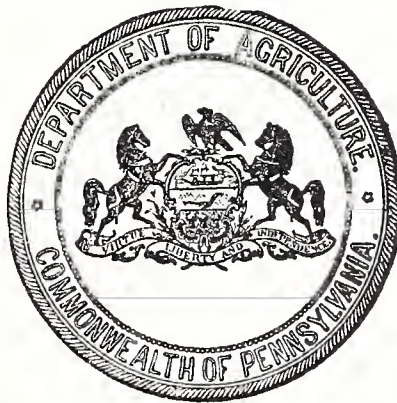
PROCEEDINGS

OF THE

TWENTY-NINTH ANNUAL MEETING

OF THE

Pennsylvania State Board of Agriculture.



HELD IN THE

HOUSE CAUCUS ROOM, AT THE CAPITOL, HARRISBURG, PA.

JANUARY 24 and 25, 1906.

HARRISBURG, PA.:

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MEMBERS

OF THE

PENNSYLVANIA STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1906.

Members Ex-Officio.

HON. SAMUEL W. PENNYPACKER, Governor.
 MAJ. I. B. BROWN, Secretary of Internal Affairs.
 DR. N. C. SCHAEFFER, Superintendent of Public Instruction
 DR. G. W. ATHERTON, President of The State College.
 HON. WM. P. SNYDER, Auditor General.
 HON. N. B. CRITCHFIELD, Secretary of Agriculture.

Appointed by the Governor.

Gen. James A. Beaver, Centre County,Term expires 1907
 R. I. Young, Middletown, Dauphin County,Term expires 1908
 Col. R. H. Thomas, Mechanicsburg, Cumberland County, ...Term expires 1909

Appointed by the State Poultry Association.

Elected by County Agricultural Societies.

	Term expires.
Adams,A. I. Weidner,Arendtsville,	1909
Allegheny,J. S. Burns,Imperial, R. F. D. No. 1, ...	1909
Armstrong,S. S. Blyholder,Neale,	1908
Beaver,A. L. McKibben,New Sheffield,	1908
Bedford,S. S. Diehl,Bedford,	1906
Berks,H. G. McGowan,Geiger's Mills,	1907
Blair,F. Jaekel,Hollidaysburg,	1907
Bradford,E. E. Chubbuck,Rome, R. F. D. No. 16,	1907
Bucks,	
Butler,W. H. H. Riddle,Butler,	1906
Cambria,H. J. Krumenacher, ..Nicktown,	1906
Cameron,W. H. Howard,Emporium,	1906
Carbon,	
Centre,John A. Woodward, ..Howard,	1909
Chester,M. E. Conard,Westgrove,	1909
Clarion,S. X. McClellan,Knox,	1907
Clearfield,J. W. Nelson,Shawville,	1907
Clinton,J. A. Herr,Mill Hall, R. F. D.,	1908
Columbia,A. P. Young,Millville,	1909
Crawford,J. F. Seavy,Saegerstown,	1908
Cumberland,Chas. H. Mullin,Mt. Holly Springs,	1909
Dauphin,	

Term expires,

Delaware,	R. M. Heyburn,	Ward,	1908
Elk,	John M. Witman,	St. Mary's,	1908
Erie,	S. D. West,	Wattsburg,	1907
Fayette,			
Forest,	C. A. Randall,	Tionesta,	1907
Franklin,	C. B. Hege,	Marion,	1908
Fulton,	R. M. Kendall,	McConnellsburg,	1907
Greene,	N. M. Biddle,	Carmichaels,	1907
Huntingdon,	Geo. G. Hutchison, ..	Warrior's Mark,	1909
Indiana,	S. M. McHenry,	Indiana,	1907
Jefferson,	W. L. McCracken, ..	Brookville,	1907
Juniata,	Matthew Rodgers, ..	Mexico,	1909
Lackawanna,	Horace Seamans,	Factoryville,	1907
Lancaster,	W. H. Brosius,	Drumore,	1907
Lawrence,	Sam'l McCreary,	Volant,	1909
Lebanon,	H. C. Snively,	Cleona,	1907
Lehigh,	P. S. Fenstermaker, ..	Allentown,	1907
Luzerne,	J. H. Snyder,	Trucksville,	1907
Lycoming,	A. J. Kahler,	Hughesville,	1909
McKean,	S. B. Colcord,	Port Allegany,	1906
Mercer,	W. C. Black,	Mercer,	1908
Mifflin,	M. M. Naginey,	Milroy,	1907
Monroe,	R. F. Schwarz,	Analomink,	1908
Montgomery,	J. Sexton,	North Wales,	1908
Montour,			
Northampton,	W. F. Beck,	Easton, R. F. D.,	1909
Northumberland,	I. A. Eschbach,	Milton, R. F. D.,	1908
Perry,	A. T. Holman,	Millerstown,	1907
Philadelphia,	E. Lonsdale,	Girard College, Phila.,	1907
Pike,			
Potter,	H. H. Hall,	Ellisburg,	1909
Schuylkill,	W. H. Stout,	Pinegrove,	1906
Snyder,	J. F. Boyer,	Freeburg,	1909
Somerset,	Jacob S. Miller,	Friedens,	1908
Sullivan,	E. R. Warburton,	Dushore, R. F. D. No. 3,	1909
Susquehanna,	E. E. Tower,	Hop Bottom,	1907
Tioga,	F. E. Field,	Wellsboro,	1908
Union,	J. Newton Glover,	Vicksburg,	1908
Venango,	August Morck,	Oil City,	1904
Warren,	R. J. Weld,	Sugargrove,	1908
Washington,	D. S. Taylor,	Raccoon,	1908
Wayne,	Warren E. Perham, ..	Niagara,	1907
Westmoreland,	M. N. Clark,	Claridge,	1907
Wyoming,	D. A. Knuppenburg, ..	Lake Carey,	1907
York,	G. F. Barnes,	Rossville,	1908

OFFICERS.

PRESIDENT.

Hon. Samuel W. Pennypacker, Governor,Harrisburg.

VICE PRESIDENTS.

P. S. Fenstermaker,	Allentown.
A. J. Kahler,	Hughesville.
S. M. McHenry,	Indiana.

EXECUTIVE COMMITTEE.

Hon. Samuel W. Pennypacker,	Harrisburg.
I. A. Eschbach,	Milton.
H. G. McGowan,	Geiger's Mills.
H. C. Snively,	Cleona.
Dr. E. E. Tower,	Hop Bottom.
Sam'l McCreary,	Volant.
J. Newton Glover,	Vicksburg.
Dr. M. E. Conrad,	Westgrove.
N. B. Critchfield, <i>Secretary</i> ,	Harrisburg.

ADVISORY COMMITTEE.

N. B. Critchfield, <i>Secretary</i> ,	Harrisburg.
A. T. Holman,	Millerstown.
H. C. Snively,	Cleona.
L. A. Eschbach,	Milton.

CONSULTING SPECIALISTS.

Botanist,	Prof. W. A. Buckhout,	State College.
Pomologist,	Dr. J. H. Funk,	Boyetown.
Chemist,	Dr. William Frear,	State College.
Vet. Surgeon,	Dr. Leonard Pearson,	Philadelphia.
Sanitarian,	Dr. Edward Patrick,	West Chester.
Microscopists and Hygienists,	Prof. C. B. Cochran,	West Chester.
Entomologists,	Dr. Geo. G. Groff,	Lewisburg.
Ornithologist,	Prof. H. A. Surface,	Harrisburg.
Meteorologists,	Prof. Franklin Menges,	York.
Mineralogist,	Prof. H. A. Surface,	Harrisburg.
Apiarist,	E. R. Demain,	Harrisburg.
Geologists,	J. L. Heacock,	Quakertown.
	Col. Henry C. Demming,	Harrisburg.
	Prof. Geo. C. Butz,	State College.
	Col. H. C. Demming,	Harrisburg.
	W. H. Stout,	Pinegrove.

STANDING COMMITTEES.

LEGISLATION.

Hon. A. J. Kahler, Chairman, Hughesville.
 Hon. Jason Sexton, North Wales.
 Matthew Rodgers, Mexico.
 J. Newton Glover, Vicksburg.
 S. S. Blyholder, Neale.

CEREALS AND CEREAL CROPS.

S. X. McClellan, Chairman, Knox.

ROADS AND ROAD LAWS.

D. A. Knuppenburg, Chairman, Lake Carey.

FRUIT AND FRUIT CULTURE.

John F. Boyer, Chairman, Freeburg.

DAIRY AND DAIRY PRODUCTS.

R. J. Weld, Chairman, Sugargrove.

FERTILIZERS.

Howard G. McGowan, Chairman, Geiger's Mills.

WOOL AND TEXTILE FIBRES.

D. S. Taylor, Chairman, Raccoon.

LIVE STOCK.

Dr. E. E. Tower, Chairman, Hop Bottom.

POULTRY.

Dr. M. E. Conard, Chairman, Westgrove.

FORESTS AND FORESTRY.

James M. Piatt, Chairman, Tunkhannock.

APIARY.

J W. Nelson, Chairman, Shawville.

FLORICULTURE.

Edwin Lonsdale, Chairman, Girard College, Phila.

FEEDING STUFFS.

Prof. F. D. Fuller, Chairman, Harrisburg.

PROGRAM.

ORDER OF BUSINESS.

Wednesday Morning, January 24, 1906.

Call to order at 9.00.

1. Roll-call.
2. Reading Minutes.
3. Appointment of Committee on Credentials.
4. Reception of Credentials of New Members and Delegates.
5. Reports of Specialists and Standing Committees:
 - a. Botanist, Prof. W. A. Buckhout, State College, Pa.
 - b. Pomologist, Dr. J. H. Funk, Boyertown, Pa.
 - c. Committee on Fruit and Fruit Culture, J. F. Boyer, Chairman, Freeburg, Pa.
6. Report of Committee on Credentials.
7. Election of Officers.
8. Unfinished Business.
9. New or Miscellaneous Business.

Wednesday Afternoon.

Call to order at 1.30.

1. REPORTS OF SPECIALISTS AND STANDING COMMITTEES—Continued:
 - a. Committee on Live Stock: D. A. Knuppenburg, Chairman, Lake Carey, Pa.
 - b. Veterinarian: Dr. Leonard Pearson, Philadelphia, Pa.
 - c. Committee on Apiary: J. W. Nelson, Chairman, Shawville, Pa.
 - d. Sanitarian: Dr. Edward Patrick, West Chester, Pa.
 - e. Committee on Roads and Road Laws: P. S. Fenstermaker, Chairman, Allentown, Pa.
 - f. Committee on Wool and Textile Fibres: D. S. Taylor, Chairman, Raccoon, Pa.
2. "WHEN SHALL WE LEAVE THE FARM?"
E. E. Chubbuck Rome, Pa.

Wednesday, Evening.

Call to order at 7.30.

1. REPORTS OF SPECIALISTS AND STANDING COMMITTEES—Continued:
 - a. Microscopists and Hygienists: Prof. C. B. Cochran, West Chester, Pa.; Dr. Geo. G. Groff, Lewisburg, Pa.
 - b. Entomologists: Prof. D. J. Waller, Indiana, Pa.; Prof. Franklin Menges, York, Pa.
 - c. Ornithologist: Prof. H. A. Surface, Harrisburg, Pa.
 - d. Committee on Poultry: Norris G. Temple, Chairman, Pocopson, Pa.
 - e. Committee on Dairy and Dairy Products: R. J. Weld, Sugargrove, Pa.

2. "BREEDING LIVE STOCK ON THE FARM:"

Thomas Shaw, Professor of Animal Husbandry, University of Minnesota, St. Paul, Minn.

Call to order at 9.00,

Thursday Morning, January 25, 1906.

1. REPORT OF EXECUTIVE COMMITTEE.
 2. REPORTS OF SPECIALISTS AND STANDING COMMITTEES—Continued:
 - a. Chemist: Dr. William Frear, State College, Pa.
 - b. Mineralogist: Col. H. C. Demming, Harrisburg, Pa.
 - c. Geologists: Col. H. C. Demming, Harrisburg, Pa.; W. H. Stout, Pinegrove, Pa.
 - d. Committee on Fertilizers: H. G. McGowan, Chairman, Geiger's Mills, Pa.
 - e. Meteorologist: E. R. Demain, Harrisburg, Pa.
 3. "BARN CONSTRUCTION AND SANITATION:"
H. E. Cook, Denmark, N. Y.
-

Call to order at 1.30.

Thursday Afternoon.

1. REPORTS OF SPECIALISTS AND STANDING COMMITTEES—Continued:
 - a. Committee on Floriculture: Edwin Lonsdale, Chairman, Girard College, Philadelphia, Pa.
 - b. Committee on Forestry: Irvin C. Williams, Chairman, Harrisburg, Pa.
 - c. Committee on Cereals and Cereal Crops: I. A. Eschbach, Chairman, Milton, Pa.
 2. "CARE AND HANDLING OF FARM ANIMALS:"
Dr. E. E. Tower, Hop Bottom, Pa.
 3. "FEEDING FARM ANIMALS:"
Prof. Thomas Shaw,
-

Call to order at 7.30.

Thursday Evening.

1. REPORT OF COMMITTEE ON IDENTIFICATION OF FRUIT:

Dr. J. H. Funk,	}	Committee.
John F. Boyer,		
A. I. Weidner,		
2. REPORT OF COMMITTEE ON IDENTIFICATION OF VEGETABLES:

Joel A. Herr,	}	Committee.
Geo. G. Hutchison,		
Sam'l McCreary,		
3. REPORT OF COMMITTEE ON LEGISLATION:
Hon. A. J. Kahler, Chairman, Hughesville, Pa.
4. "BARN VENTILATION:"
H. E. Cook.

PROCEEDINGS OF THE ANNUAL MEETING OF THE STATE BOARD OF AGRICULTURE, HELD IN HARRISBURG, PA., JANUARY 24th AND 25th, 1906.

9 A. M., Wednesday Morning, January 24, 1906.

Vice President S. S. Blyholder in the Chair.

The CHAIRMAN: The hour has arrived for the opening of the Twenty-ninth Annual Session of the State Board of Agriculture. The Secretary will call the roll.

MR. HERR: Mr. Chairman, in noting the presence of members, those whose terms expire in 1906 should not be recorded.

The SECRETARY. That distinction will be made, Mr. Herr.

The roll of members was called by the Secretary, and at this first roll-call and a subsequent call, the following persons answered to their names, a quorum being present at the first roll-call; the names of those present whose terms expired in 1906, being recorded in italics:

R. I. Young, Gen. James A. Beaver, *N. G. Temple, A. I. Weidner, S. S. Blyholder, S. S. Diehl, H. G. McGowan, E. E. Chubbuck, W. T. Davis, J. A. Woodward, M. E. Conard, S. X. McClellan, J. W. Nelson, J. A. Herr, J. M. Witman, C. B. Hege, R. M. Kendall, G. G. Hutchison, S. M. McHenry, W. L. McCracken, Matthew Rodgers, W. Northrop, W. H. Brosius, Samuel McCreary, H. C. Snavely, P. S. Fenstermaker, A. J. Kahler, W. C. Black, M. M. Naginey, R. F. Schwarz, Jason Sexton, W. F. Beck, I. A. Eschbach, A. T. Holman, W. H. Stout, J. F. Boyer, J. Newton Glover, R. J. Weld, D. S. Taylor, W. E. Perham, M. N. Clark, D. A. Knuppenburg, G. F. Barnes and N. B. Critchfield, Secretary.*

Members ex-officio present were: Hon. S. W. Pennypacker, Governor; Maj. I. B. Brown, Secretary Internal Affairs; Dr. N. C. Schaeffer, Superintendent of Public Instruction.

The following consulting specialists were present: Dr. J. H. Funk, Pomologist; Dr. Wm. Frear, Chemist; Prof. Franklin Menges, Entomologist; E. R. Demain, Meteorologist; Col. H. C. Demming, Mineralogist and Geologist; W. H. Stout, Geologist.

The CHAIRMAN: A quorum being present, I will appoint as the Committee on Credentials, Messrs. Herr, of Clinton; Naginey, of Mifflin; Clark, of Westmoreland; McHenry, of Indiana, and Weld, of Warren.

The SECRETARY: Before that Committee goes out, it might be well to read the minutes of our last meeting.

The CHAIRMAN: Yes, pardon me, I forgot that; the minutes will be read by the Secretary.

The CHAIRMAN: You have heard the minutes of the last meeting, gentlemen, what is your pleasure?

MR. HUTCHISON: Mr. Chairman, I move the adoption of the minutes as read.

The motion being seconded, it was agreed to.

The CHAIRMAN: While the Committee is considering these credentials we will have the pleasure of hearing from visitors. We have the great pleasure of having ex-Secretary Edge with us, and we would be very glad to hear from him this morning.

MR. EDGE: Mr. Chairman, this is rather new to me; it is the first speech I have delivered in six years. My mind ran back to the first meeting of the Board, as I sat here and looked over the list, and I was impressed with the fact that of the members of the Board at that first meeting, there are now but two members living, Prof. Hamilton and myself. I do not know as I have anything further to say. I well remember that first meeting at which there were 21 members, 13 from the county societies, an unlucky number, usually, but it did prove to be lucky.

DEPUTY SECRETARY MARTIN: Mr. Chairman, when the Secretary called the roll of members it brought to my mind very vividly that I have been in receipt of a letter from an old and very worthy member, Mr. M. W. Oliver from Crawford county, stating that he is lying seriously ill which will account for his absence from this meeting. I think it will be well that the Secretary be instructed to address a letter of sympathy to him as coming from his fellow-members at this meeting.

The CHAIRMAN: Very well, we should be glad to have the Secretary do that.

The SECRETARY: Mr. Chairman, it would be better, in carrying out Mr. Martin's suggestion, that there should be a motion to that effect.

MR. SEXTON: Mr. Chairman, I move that the Secretary be instructed to carry out the suggestion of Mr. Martin and to direct a letter of that kind to the unfortunate brother.

The motion being seconded, it was agreed to.

The SECRETARY: Mr. Chairman, we may have as good an opportunity to get acquainted with Prof. Shaw now as at any time in the future. He is here to render us assistance, and I would suggest, that as a means of becoming acquainted with the audience and with the room in which he is to do his talking, that he come forward and tell us a few things now.

The CHAIRMAN: I am glad to present to you, Prof. Thomas Shaw, of Minnesota.

PROF. SHAW: Mr. Chairman and Gentlemen, I hardly know how it happens that I have not had the pleasure of seeing very much of your magnificent State until yesterday, and it was a little bit an-

noying, though complaints can be made against no individual, that the mist prevented seeing very much then, but I saw enough to create a longing to come back to see this country in its spring and summer glory, for judging by what was seen yesterday, it must be a magnificent country in the summer season. It seemed to me that it was a country covered with mines, that the hills were filled with wealth; and no doubt there is a great deal of truth in that thought. And probably that thought covers another thought, that might at first seem true, that the mineral wealth of the State of Pennsylvania is greater than the agricultural wealth. But I know that that is not true; the agricultural resources are greater. You honey-comb the mountains and take out the mineral wealth from those mountains and no power can ever put it back again, but the agricultural resources of this State go on and on, they flow on forever, so that I have no hesitation in saying that the first foot of soil is worth more than all the mines in all the mountains in this magnificent State. Now if that is true, sir, it is exceedingly important, how that first foot of soil shall be cultivated. I do not need to tell you intelligent gentlemen, in the face of the fact just stated, that the care of that first foot of soil is the most important concern that can engage the attention of the Legislature of this State, and it does give me a good deal of concern, a good deal of pain when I think of the way in which the first foot of soil is not taken care of in these United States of ours.

If the question were put to me: What is the agricultural crime of the American people, I would say it was the waste of the heritage which has been given us by our neglect in preserving the resources of the soil in this country.

I felt somewhat sad, sir, when I heard of the increase in the exports of agriculture from the United States. I would not feel thus if that increase in exports came in by way of animals and animal productions. I would not feel as bad; it would be a matter for congratulation, but when I heard that there is an increase of the exports of corn and other products that were taken out of the soil of this country and sent across the sea to be used by our competitors, I do feel sad when I think of it, and know that that is going on to the extent to which it is at the present time.

I frankly acknowledge that I do not know enough about the conditions of agriculture in the State of Pennsylvania to talk about it intelligently, but I do hope that the farmers of this State are studying that question of taking care of the soil. I hope that they are giving their attention to that question of keeping the soil from deteriorating. It is something that can be done, and if the person engaged in tilling the soil properly understands that it is his business interest to do this, no doubt it will be done.

I was told yesterday that this State pays out five million dollars annually for artificial fertilizers. I have no quarrel with that; it would be all the better if the State paid out ten million dollars if they were properly used, but I can't help but think that there is a way to get fertilizers, if wanted, without paying for them at all. Now, do not misunderstand me; I mean to say that in my judgment any one by giving more attention to good methods of agriculture can dispense with the purchase of artificial fertilizers, and can get what is needed without paying for it. If you ask me how, I would

say by buying the live stock from the western ranges and in the stockyards and bringing them to your farms and feeding that live-stock so that your fertilizer can be obtained practically without any other expense than putting it on the soil. If you ask me, Can this be done? I answer, I think it can. I know that food can be fed to these animals—I know that food can be fed either to cattle or sheep, and the man that feeds it will make some money, not perhaps a very great deal, in addition to the fertilizer which is thrown into the bargain. Now if that is true, it seems to me there is a wide open door for engaging in this work. It seems to me, sir, that there is no way of building up the soils of Pennsylvania than the one suggested, by grazing, by bringing sheep and putting them over these hills that we saw everywhere yesterday, by feeding rich food, food that is rich in fertilizing matter, and in this way make profits by growing sheep, and increasing the fertility of the pasture at the same time by doing so. But I fear I will trespass on your good nature by occupying your time further. You asked me to appear before you, and I have responded to the call. I thank you for the generous hearing which you have given me.

The CHAIRMAN: Now then, we are ready to proceed with the Reports of the Specialists and Standing Committees. We will first hear from the Botanist, Prof. Buckhout.

The SECRETARY: Mr. Chairman, Prof. Buckhout is not here, but his report is here, and can be read or can be printed without being read as may be desired.

It was moved and seconded that the report be printed without being read, which was agreed to. The report is as follows:

REPORT OF THE BOTANIST.

BY PROF. W. A. BUCKHOUT, State College, Pa.

My correspondence during the past year has not been materially different in character and amount from that of former years. The same questions periodically appear with slight differences in setting. Hence I select for particular mention only those which are typical and respecting which the farming community still needs to be specially informed.

Weeds of one kind or another are frequently sent me for determination, generally coupled with the inquiry, how to get rid of them. The golden-yellow or hop clover seemed unusually abundant and conspicuous last year, particularly in the northern tier of counties. This is a good type of a plant, technically, a weed, but really only a somewhat inferior species of its kind, and hence not to be encouraged. White clover or red should take its place, since they produce a larger quantity and more nutritious forage. This is sometimes accomplished naturally, the two latter species being the stronger growing and gradually displacing the former which is of a weaker constitution and less well adapted to most soils. Close cut-

ting of the yellow clover will often hasten the process of replacement, but should this not avail, resort must be had to plowing down and reseeding.

Special care should be taken that the seed used be clean and good, and that the ground be in condition to make a good seed-bed and thus favor quick germination. This is the whole secret, if such term may be used, for destroying undesirable plants, or weeds, and establishing strong, resistant growths of desirable and more useful grasses and clovers. It is true, this is not always an easy thing to do, but it is what should be aimed at, and the details of the process must be left for each one to supply, according to his conditions and surroundings.

With the Orange hawkweed, or "paint-brush," the case is much more difficult, since the weed is more aggressive and is very much at home in our lighter soils, where it crowds out the better pasture and meadow grasses, unless prompt measures are taken to dispose of it. It is idle to attempt to do anything in this instance except to plow the sod-lands and reseed them, preferably after a year or two of cultivation. The worst case of all is where small, close-growing creeping weeds, such as certain chickweeds and speedwells, permeate lawns, and gradually gain such complete possession that the beauty and serviceability of the lawn are ruined. Slight cases may yield to careful and persistent weeding, joined to watering and top-weeding with fertilizers, but, when the weed tenants have well entrenched themselves, nothing short of the plowing and reseeding process will avail, no matter how inconvenient or undesirable it may be on some accounts. There is nothing new in this. I repeat it, because I am convinced of its soundness, and have no faith in any of the special means of weed eradication. They are applicable and advisable only under particular circumstances, which do not inhere in the three instances named. The curious parasitic plant, dodder, was again reported several times from clover fields. Fortunately, it is not of very common occurrence in our State, and, when it is found, seldom covers any but small patches, here and there, of but a few square yards area. Within them it may grow profusely, and choke out everything which it touches. The whole tangled growth should be mowed and removed before its seeding can take place. It is not likely to appear a second year. It reproduces only from seed, and poor clover seed is probably always responsible for dodder in our climate.

Of plant diseases, I get various fragmentary examples, almost invariably too late to be of any service to the senders, and, sometimes, of such diseases as permit of no remedial measures at all. While my replies may thus be of no direct service at the time, they should lead to a more careful attention of farmers and fruit growers to the details of their business, so as to recognize the first appearance of a disorder, and thus apply in time such remedial or destructive measures as experience has determined best. The apathy and indifference in this regard are surprising, even in the simpler matter of insect attack. Many nurserymen and orchardists have never even seen the San José Scale, although it may be present on, and already injuring their trees. As well might a horseman expect to succeed in dealing in horses if he did not know the appearance of ringbone or spavin. It is "the stitch in time that saves nine" of plant dis-

eases that are purely seasonable, and for other reasons not controllable, an interesting one of this past season was the corn leaf-blight, which, I think, must have been quite prevalent over the whole State, although I know of it only in Centre and Chester counties. It caused the leaves to dry prematurely, giving the appearance of having been killed by frost. Slight rifts in the skin showed smut-like spores of a peculiar structure. A knowledge of the life history of fungi proves that this particular fungus caused the leaf drying. Presumably, such affected plants were less fruitful than otherwise, and, particularly, ripened their grain less fully. But, fortunately, a generally favorable season gave us, none the less, a corn crop remarkable for its abundance. Probably some good observers among our farmers could assign a particular figure, or percentage of loss, due to the unwonted appearance of this fungus visitant.

To my mind the most important matter of the season, was in the receipt of samples of rape plants and rape seed from several widely separated localities, with the inquiry whether they were of the true rape useful for feeding purposes. Few matters illustrate so well the value of a little, simple, technical knowledge. Rape is a general name for several varieties of mustard-like plants which are grown for two distinct purposes. First, for the seed, only, from which rape-seed oil is produced; second, for succulent forage, to be used particularly during late summer and fall. The first mentioned run rapidly to seed, and produce but little and poor leafage; the second are shorter stemmed with profuse growth of leaves, and usually do not produce seed the first year in this climate. The best known variety of this latter type is the Dwarf Essex rape, and this is what is desired for forage and soiling purposes. Unfortunately, the specimen plants and seeds which I received were all of the first or oil-producing type, and practically useless for forage. The growers were, therefore, greatly disappointed and inconvenienced. Indeed, it is probable that but few retail seed-dealers are acquainted with these facts regarding rape or are able to distinguish the two types of seed, since the differences are small and poorly defined. Reliance must be placed upon the seed-grower and faith in his integrity. From the carelessness of dealers, as shown in these cases referred to me, I incline to think that a suit for damages would be the best corrective. The purchaser has a right to expect not only clean seed, but seed true to the particular type named.

The CHAIRMAN: Dr. Funk is next on the program.

It appeared that Dr. Funk was not present.

The CHAIRMAN: The Doctor not being present, we will pass to the next topic, Report of the Committee on Fruit and Fruit Culture, Mr. J. F. Boyer, Chairman.

The SECRETARY: Mr. Chairman, I want to make a little explanation; I think I got a letter into the hands of everyone stating why it was that we met here. When the place for meeting came up I secured, what I thought was the very best place in the city, the United States Court room, and I thought there would be no trouble about it, but after that arrangement was made it developed that court would be held there on the date fixed for our meeting. The

gentlemen with whom I made the arrangement stated that such a thing as that had never occurred, and would not be likely to occur once in twenty years. That would have been a very convenient and pleasant room indeed, and perhaps the most so of any room in this city.

Just about ten days before the date set for our meeting, I learned that the United States Court was going to be in session on the twenty-fourth and twenty-fifth. Then I found that I was up against a proposition that was entirely unexpected, and I at once saw the Superintendent of Public Grounds and Buildings, and he said that he could give us this room and have it put in order so that everything would be as comfortable as would be required. I had no thought of any such noise going on here as we are now having, and I simply make these remarks so that you can understand the facts.

Mr. Boyer then read his report, which is as follows:

REPORT OF COMMITTEE ON FRUIT AND FRUIT CULTURE.

BY J. F. BOYER, Chairman.

Mr. Chairman and Members of the State Board of Agriculture:

The following is a brief report of the conditions of the fruit crop of the year 1905 in Pennsylvania.

First, as to the apple crop. Of all fruits the apple is the most important, as it can be held in its natural form the year round. This, however, does not apply to orchards planted by our forefathers. Those orchards are principally summer and fall varieties and certainly must take a back-seat, as new and improved varieties are taking the lead and common varieties will not, in ordinary crop season, bring enough money to pay cost of marketing.

Pennsylvania ranks fairly well with the apple-producing states of the Union, and by studying the improved varieties and selecting those best adapted for various soils found in Pennsylvania, the State will soon become one of the leading apple-producing states in the country. This fact is evidenced by the season just closed. The year 1905 goes on record as an off-year. Ohio, Michigan, Illinois and the New England states claim only a partial crop, even New York, which is known as a leading apple-producing state, reports a partial crop; while improved varieties brought forth a full crop in Pennsylvania. This of course applies only to sections where apple culture is made a business, as for instance Adams county, the home of the York Imperial, where this variety grows to perfection. Take the State as a whole, the apple crop was only a partial one; but it can be said that Pennsylvania ranks well with the leading apple-producing states of the Union. The quality also ranks well with those produced anywhere else.

Pears.—The pear generally is not grown, commercially, in Pennsylvania, excepting the Kieffer. A few orchards have been planted, commercially, and according to reports, do not produce as well as where fewer trees are planted with other varieties. By this we learn that cross-fertilization must be practiced. While blight seems to be

the destructive agent in all other varieties of pears, the Kieffer seems to be the most exempt, and if some variety can be found hearty enough to cross-fertilize the Kieffer, abundant crops can be grown. In its raw state it does not compare favorably well with such varieties as Bartlett, Seckel and a few others, but can easily be made into a Bartlett; just grow them on a suitable soil and pick before fully ripe and can, and you have a pear equal to the best Bartlett.

Peaches.—Of this fruit a full crop was secured in most parts of the State. The quality also was good; especially is this true where growers kept their trees in a high state of cultivation and did not allow their trees to overbear. In all such cases remunerative prices were obtained. The late fungi, however, could not be entirely controlled, as an excess of rain during the month of June and not enough sunshine caused some of this fruit to rot. This was more prevalent in some sections than in others.

Plums.—As usual, the Japan varieties brought forth a fair crop, while native varieties, as far as my knowledge goes, were almost an entire failure.

The Quince.—This fruit has almost been wiped out of existence by blight. The few scattered trees brought forth a fine crop.

Cherries.—It can be said that this fruit, especially the Morelloes (sour varieties), Early Richmond and Montmorency, produced fair crops and seem to hold the highest rank, being adapted to almost any and all soils and locations. Sweet varieties seem more choicy as to where they are planted. They are short-lived in valleys or low grounds, but seem to thrive fairly well on elevated light, warm soils.

Grapes.—This fruit is not grown, commercially, in Pennsylvania, excepting in the northern part of the State where the crop proves quite satisfactory to its owners. Spraying is of even more importance in growing this crop than in most other fruits.

Small Fruits.—Of this crop we can say it was a money-maker. The crop was an average one in most parts of the State and satisfactory prices were secured. Mention must also be made as to spraying. The small fruit growers must, in order to succeed, continually fight the various insect pests.

To sum up, I would say, the Pennsylvania fruit grower has no reason to feel discouraged, even though all he hears, or nearly so, at our horticultural meetings is about the various funguses, and more particularly about the San Jose Scale. This is all right; it sets us to thinking and those who have thus far tried to grow fruit in Nature's way ought to take the warning and put on their thinking caps and a business coat and realize that the man who grows fruit is selling his products at a profit, while the man who depends on nature to grow his fruit generally finds no profit in the business.

In conclusion, will say, since Nature does not grow profitable crops any longer and since spraying must be thoroughly done, cut down all trees that are of such varieties that their fruit crop does not bring enough money, when marketed, to pay the bill; for unless you destroy them they are a source of insect breeders, and while they served a good purpose and supplied father and mother with fruit, perhaps, all their lifetime and for that reason you leave them stand. By all means honor your father and mother and spray those trees thoroughly.

The CHAIRMAN: Gentlemen, you have heard this report; are there any remarks?

A Member: Mr. Chairman, I would like to ask whether the same treatment that will kill the San José Scale will also destroy the scurfy scale.

MR. BOYER: Yes, the lime, sulphur and salt will also destroy the scurfy scale.

MR. HUTCHISON: Mr. Chairman, we have with us Prof. Fuller. He is doing a line of work of interest to us all. He is a new man from New York State and I would like the members to meet him, and would call on him to come forward and say a word.

The CHAIRMAN: We shall certainly be very glad to have the pleasure of hearing from Prof. Fuller.

PROF. FULLER: Mr. Chairman and Members of the Board of Agriculture: Coming down from Clearfield county the other day on the train with Mr. Hutchison and the Secretary, Mr. Hutchison said, the State Board meets in Harrisburg next week and I would like to have you come and meet the members. I assured him of my pleasure in coming and meeting the members of the Board. I asked him on what subject I should speak. He said, well, tell them what you are doing for the farmers of Pennsylvania.

My work is under the direction of the Secretary of Agriculture, covering the inspection of stock feeding foods and ascertaining if they are pure and if they are up to the standard of excellence guaranteed by the manufacturers. Periodical visits are made by the agents of the Department in all the various sections of the State for the purpose of collecting samples that are found in the markets; these samples are forwarded to Harrisburg for examination, both chemical and microscopical. During the past year some three hundred samples have been secured in this way and sent to my laboratory. Only one serious adulteration has been found in the line of feeding stuffs. It was an adulteration discovered in the western part of the State where a sample of wheat bran was adulterated with rice hulls. This was a very serious adulteration, rice hulls being injurious to farm animals. Most of the violations of the law at the present time seem to be in regard to the improper branding of offals, especially of bran and middlings. The amendment to the present law, which was approved the 24th of April last, provides that the wheat offals and similar substances shall be tagged showing the percentages of protein.

During the past ten months between fifty and sixty prosecutions have been brought in ten different counties. Of these prosecutions we had fourteen cases against dealers handling a feed manufactured by a western firm, and the adulteration in these cases was a deficiency in the amount of protein and fat, the deficiency in protein varying from one to four per cent. and the deficiency in fat about one and a half per cent.; this of course caused a serious loss to the consumer. The manufacturer of this particular brand of feed has very wisely agreed to back up the dealers and pay the stipulated fines in each case, withdrawing the unfit goods from the market and either lowering the guaranties or improving the quality of this brand of

feed. This certainly is an important step in the right direction and is a material benefit to the dealers handling this feed manufactured in Western states.

Over two thousand dollars have been collected in fines. But the Department wishes it to be understood distinctly that this fact is of minor importance as compared to the fact of the benefit which the dairymen of this State will receive from this legislation.

I thank you very much for this opportunity for speaking a few words, and I hope I shall have the pleasure of meeting you individually.

The DEPUTY SECRETARY: Mr. Chairman, I would like to make an inquiry. Prof. Fuller stated that there was a variation of the protein-contents in different brands. I would like to inquire if he found in his analysis of these brands that different grades of wheat would make a variation; if so, what causes that variation?

PROF. FULLER: I would state that I have found that the wheat offals of last year and this year also are of inferior quality. I believe that is due to climatic conditions; I believe that the millers are not able to get all the flour from the wheat, because I find that more or less flour is dragged down and goes into the bran and middlings.

MR. HUTCHISON. I would like to ask the Professor in reference to the samples of Western goods analyzed, in dollars and cents; what variation was there between their guaranty and what you found?

PROF. FULLER. I would state that it is almost impossible to set any definite common price for protein and fat, although I made a calculation approximately and found there was a difference of between five and seven dollars between the price set by dealers and the actual value. Feeding stuffs are entirely different from fertilizers; in feeding stuffs we not only have protein to create fat but we have the ash and the carbohydrates; we find all these materials in feeding stuffs and they all serve their purpose. It is almost impossible to state any common value for the protein and fat.

A Member: Mr. Chairman, I would like to ask the Professor if he has ever made any analyses of buckwheat flour sold on the market.

PROF. FULLER: I would state that I have not.

A Member: Mr. Chairman, I would like to ask the speaker whether he found any particular adulterants that came from the West?

PROF. FULLER: I would state the only adulteration I have found during the past few months was the substitution of oat hulls for the whole oats. The manufacturers in the West use only the best grains for their breakfast foods, take the breakfast foods where oats are used, and they use only the best oats. As I have already stated, rice hulls have sometimes been used as an adulteration, and coffee hulls are sometimes found.

A Member: I would ask if we are to understand that some of these samples were under the value to the extent of six or seven dollars a ton?

PROF. FULLER: I would state the analysis showed a value of five or seven dollars a ton below the selling price, due to the deficiency in the most important ingredients in the feeding stuff, protein and fat.

The SECRETARY: That was below the selling price and not below what the price should have been according to the guaranty?

PROF. FULLER: Yes.

MR. HUTCHISON: Mr. Chairman, I might state that the results of his work will be published in a bulletin and can be had by any one interested. The chemical work is now going on, and in a month or six weeks the bulletin will be ready for distribution, giving all the results of the analyses, together with other information. The Department will be glad to supply copies to anyone making application.

MR. CHUBBUCK: Mr. Chairman, this discussion brings to my mind a little thing that happened to me last fall. I raised and wished to grind about five tons of buckwheat flour. I found what the price was in my own town, where there is a large mill that grinds and ships flour, wherever it is wanted, by the car or by the ton. In the city of Philadelphia is a firm guaranteed by *The American Agriculturist* as being all right, and I wrote to that firm and asked them what they could handle three to five tons of buckwheat flour for, and they wrote back to me a price that was 25 cents less than I could get from the wholesaler in my own town. Now, why was that so? All I had to do was to take my buckwheat to this mill and he took the flour at \$2.50 per hundred, while I would have had to take the flour and ship it to Philadelphia and there realize only \$2.25 a hundred.

MR. HUTCHISON: Mr. Chairman, it might be that Philadelphia has an over-production or that they have a market they can draw upon which furnishes them all they need. It might be that they were getting buckwheat adulterated with some cheap product. In the work I was doing this year, I ran across a gentleman who was selling corn flour, large quantities of it. I overheard a conversation between two or three millers, men whom I knew very well, and they stated that you could use with profit, corn flour as a mixture with buckwheat flour, and reduce the price, but whether they did this or not, that I cannot say, but that might be another reason, or they might be using some wheat flour, perhaps.

MR. CHUBBUCK: In my question I did not think that they could draw from any other section where they could get it any cheaper than that.

MR. SEXTON.: Mr. Chairman, it has been our annual custom to appoint a committee to wait upon the Governor to let him know that the State Board of Agriculture is in session.

I therefore move that a committee be appointed to wait upon the Governor and inform him that the State Board of Agriculture is now in session.

MR. HUTCHISON: I second the motion.

The question being put, it was agreed to.

The SECRETARY: I may say to that committee that the Governor is not in the city to-day. He is aware of the meeting but has duties calling him away from the city.

MR. HUTCHISON: Mr. Chairman, we have with us a State official whom I know you would all be glad to have a word from, Major I. B. Brown, Secretary of Internal Affairs, a member of our Board. This is a little experience meeting and I know you will be glad to hear from him.

The CHAIRMAN: We certainly would be pleased to hear from Major Brown.

MAJOR BROWN: Mr. Chairman: The gentleman has said that this is an experience meeting; I have just dropped in here simply to get my name on the record as being present. It is the first time I have been out of my house for the last ten days. I have been laid up with rheumatism, but I am glad to know that my friend from Huntingdon and others are giving their experiences. All of us have had our experiences in all those things which make up human life, and those who have had experience on the farm, have had experience in the avocation which has made this world, its industries and development very largely what they are. We may talk about our railroads and the great service they have done in developing natural and material interests, yet behind all this is the man on the farm with the hoe and the shovel, with the plow and the reaper and the mower, doing that work on which all others so very largely depend.

In my political life I have never had an opportunity of mingling very much with the agriculturists of the Commonwealth, my line of public service being more with corporations, more with the varied industries of the Commonwealth, the manufacturers and all the lines of enterprises connected with corporate service, so that I have never been able to touch elbows in the work and in the developments in which you are so earnestly engaged; but when I think of my own native State of Pennsylvania, and ride through it, as I have so frequently in years past, and see the farmers working upon the highlands and in the valleys, certainly there is everything that meets our eyes to convince us that the State of Pennsylvania cannot in any way afford to be unmindful of the loyal services of our citizens who are engaged in agricultural pursuits.

Now I do not know—I hadn't the remotest idea of being called upon to say anything here—I do not know what your program is, and my remarks, of necessity, must have been rambling, but I do take it as a great honor that you have conferred by permitting me to say this much on this occasion.

The CHAIRMAN: The committee to wait upon the Governor are Messrs. Sexton, Chubbuck and Knuppenburg.

COL. WOODWARD: Mr. Chairman, with your permission, I am not going to relate my experience, but I would like to contribute a little information to the members of the Board.

I presume that every one of us realizes the importance of Pennsylvania as a dairy state. We stand second or third in the importance and value of that industry.

You know that our State College has for sometime been in the throes of reorganization of its agricultural faculty, and you know,

too, that we have been deprived for some time of the services of Professor Hewitt, who usually attended our meetings and was an active and efficient professor of dairying. I do not know that you are all aware, though I presume most of you are, that we have lately succeeded in obtaining the services of a professor of dairy husbandry, having enlarged that department, and that we have lately succeeded the liberality of the State—have succeeded in manning it to the extent of putting in charge a professor of dairy husbandry. I do not want you to think that that is the whole force that is intended to be utilized in that building, that new building which some of you have seen and enjoyed and appreciated, but I want you to know that we have secured a man whose reputation is second to none of his age in the country, who is entirely competent to take charge of the dairy interests in Pennsylvania and to look after them as they have never been looked after before.

One of our allied organizations, the Dairy Union, has recognized the ability of our young friend, and recognized his importance to the dairy interests of the State by making him the President of the Dairy Union, and I want to ask permission of the Board to present to them for just a moment, this gentleman in order that you may look in his face and become acquainted with him. I refer to Professor H. E. Van Norman, from Purdue University of Indiana, now Professor of Dairying in the State College of Pennsylvania, and I have great pleasure, with the permission of the Chair, in now presenting to the Board, Professor Van Norman.

The CHAIRMAN: Will the Professor please come forward?

PROF. VAN NORMAN: Mr. Chairman and Gentlemen of the State Board: That is about as embarrassing an introduction as I ever had.

MR. HUTCHISON: That don't hurt you; we know you.

PROF. VAN NORMAN: I may say that in accepting the position which the trustees of your State College offered me, I did it with a full appreciation and knowledge of the fact that Pennsylvania ranks second in the volume of her dairy products, and that dairying is a very important factor in the agriculture of a State which, sometimes in the minds of some people, is overlooked. Agriculture is a very large factor in the welfare of the Commonwealth of Pennsylvania, and at this time I can only say that it will be my purpose to make the Department, over which I have charge and responsibility, serve the dairy and agricultural, and directly or indirectly, all the interests of the State to the full extent of its possibilities. My work is educational and in as far as the educational work of the dairy department of the State College can serve you, I am at your service and I shall appreciate your interest in the work. I am ready to help the cause of better dairying to the best of my ability. Large numbers of cows are kept at a loss, as investigation in this and other states shows. It shall be my purpose to lessen the number of cows kept at a loss, and the number of horses kept at a loss, primarily, by teaching these young people whom you see fit to send there, what they need to know. We have at the present time in progress a creamery course, and I hope to be able to increase it and to add other courses

such as care, handling, feeding and production. This State produces an immense quantity of milk, some of it used right near where it is produced, and some that is shipped. At the present time we offer no course in that work, but there is much that can be taught that will be beneficial even from the point of view of dollars and cents.

As I conceive, our education should do two things, broaden the young man's grasp and increase his earning power in taking advantage of these opportunities, and it will be my purpose to work to this end.

It is said that we cannot get people to the State College because of its location. I hope that will not deter you gentlemen from coming there; some of you already know that the State has been liberal in its appropriations for equipments and in the way of a building for dairy husbandry work. I hope to make the work merit its continued support, and I hope I may have the privilege of meeting you there personally, and of welcoming you to an investigation of our work there now and in the future.

COL. WOODWARD: Mr. Chairman, with your permission, I would like to contribute another experience, or make another statement.

The CHAIRMAN: We shall be glad to hear from you further.

COL. WOODWARD: I know that you have enjoyed this because I know the feeling that exists throughout the State; I know that you have enjoyed the experience of learning that you have a man at the head of that work who is amply qualified to promote its interests throughout the Commonwealth. Now, what I am going to speak of, it has not been permitted to speak of earlier than this because the situation has been such that it could not before be made public, but at the meeting of the Board of Trustees last night certain action was taken which permits me to bring this to your attention now. If the question of dairying is important, and it is, the question of animal nutrition in all its breadths and depths and lengths is more important, because the greater includes the less.

Your servants and the servants of the whole people of the State, the Board of Trustees of State College, have felt this and appreciated this for a long time, and those of you who follow these questions closely, know that we have in the service of the State a man who is recognized throughout the United States, as the authority upon animal nutrition. He is recognized by the Department of Agriculture as an authority upon that subject, and because of that recognition by the Department of Agriculture, some years ago the Department undertook to buy and to co-operate with the Board of Trustees of the College in the establishment of a new, scientific instrument, specifically known as a respiration calorimeter. Most of you have seen it there and investigated it, but I do not believe that very many of you know very much about it. I could not explain it to save my life, and I do not believe that my friend, Dr. Tower, could tell very much more about it than I can. It was placed there by the National Department of Agriculture, the first and only one in the work, because they recognized the ability of the gentleman whom I have mentioned, because of his deep research into the question of animal nutrition, a research not approached by any other man in the United States.

In considering the reorganization of our agricultural department at the College, and in accepting in good faith the appropriations that have been made for the new agricultural buildings, including the dairy buildings, which are recognized now among the finest in the United States, and in accepting the responsibility thus placed upon us by the State, it was deemed wise that the Department of Agriculture should have enlarged facilities, and it occurred to some of us that to separate from the technical work of the Experiment Station, which is a part of our work at the College, the distinguished gentleman to whom I refer in the line of animal nutrition, would be a desirable change. To relieve him from the direction and detail of the executive work and to set him aside in order that he may use his recognized skill and qualifications for better and deeper research along the special line in which he has so much distinguished himself, of animal nutrition, therefore, the trustees of the College have set aside Dr. Armsby to this work, and in a sense have consecrated and dedicated him to it. He has arrived at the maturity of life; he is developed and equipped for this work as no other man in the State or the United States is. Those who know him and his great work fully realize this. We have, therefore, made a separate department of this branch apart from the work of the Experiment Station, naming it "The Institute of Animal Nutrition," and have called Dr. Armsby "The Director of Nutrition," and set him aside for that work, relieving him of this drudgery of the Experiment Station and propose to put that upon the shoulders of a younger and newer man who will have the opportunity to grow into the just reputation that Dr. Armsby now enjoys.

Now, then, I have the pleasure of presenting to you our old and distinguished friend, Dr. H. P. Armsby, as the Director of the Institute of Animal Nutrition, and the greatest authority in the United States to-day in that field.

DR. ARMSBY: Mr. Chairman and Friends: If Colonel Woodward's introduction of Prof. Van Norman was embarrassing, I am very sure that he has very much improved upon it in that respect in his introduction of me, yet I confess that I rather welcome this opportunity, this public announcement of the change for several reasons, and among others, because it relieves me, in a degree, from some embarrassment arising from my knowledge of this proposed change. I necessarily stood for the past few months in what was, in a way, a false position, as officially and ostensibly representing the administration of the Experiment Station, and, by implication at least, the general agricultural work of the College, while at the same time I knew myself that that work was to be taken up very shortly by some one else, and for that reason I am very glad that the time has come when the situation could be cleared up, and the exact relation of things made public.

Now let me say most emphatically that this change does not in the slightest degree lessen my interest in the general agricultural progress of Pennsylvania, and I hope that whenever there is a possibility of my serving the interest of this Board of Agriculture, or the interest of agriculture in this State, that I may be called upon, and I assure you that you shall have the best effort of which I am capable. I should be exceedingly sorry if this change should lessen

in any degree the very pleasant relations which have existed for so many years with the members of the Board of Agriculture and with other agricultural organizations in this State; and while we are looking toward, and confidently anticipating a very much larger development in the Department of Agriculture at the State College, I hope to keep somewhat in touch with them in the future as I have in the past.

Let me say one thing more: It seems to me that this change is a significant one, because it is a more marked, and to me of course very flattering recognition of the importance of abstract research into the fundamental principles underlying the art of agriculture. Those of us who can look back fifteen or twenty years, can readily see what this means. Those who can remember the general estimation in which such investigations were held twenty years ago, the attitude of the agricultural press and of agricultural meetings, farmers' institutes and boards of agriculture toward them, will see that a very marked progress has been made within a decade; that the fundamental importance of scientific research—research into principles as distinguished from the investigations into the applications of principles and practice has made tremendous strides, and I believe nowhere is it more marked than in Pennsylvania, and I trust that the work of this new department of the College, while it will necessarily be abstract, which will sometimes seem to have very little relation to important practical problems, yet I venture to hope that in the long run, it may be as practically serviceable to the agricultural interests of Pennsylvania as any other line of work which the institution may undertake.

COL. WOODWARD: Mr. Chairman, I simply want to make a statement in regard to the future of the Department of Agriculture at the State College. We have undertaken a new organization; we believe that Pennsylvania is now ripe for wonderful and new developments in agriculture, and we realize that under the organization of agriculture in this State, the State College must be kept abreast of the needs of the people engaged in the various lines of agricultural industry.

We have undertaken to secure leaders in the work. What we have done in some directions you have seen this morning, and I want to say to you that we are looking earnestly and seriously and constantly for men to take the lead in agricultural education in the various branches of the work. We are looking for large men, we are looking for capable men, for men old enough to be thoroughly equipped for the work, and yet young enough to have an opportunity to make a record for themselves in life, and anxious and energetic enough to make that record. The gentleman whom we have in view at present, I shall not be able to name in connection with the direction of the State Experiment Station, but I want to say to you that we have in view and have strong hopes of securing the services of a man who is conceded by some of the best agricultural authorities in the State to stand not lower than third in the list of men available for the position, a man of large experience, of largely developed equipment, great ability and nationally of recognized worth in the agricultural line. We hope to secure the services of that man. I simply wanted to make this statement for the encouragement of my friends upon the Board so that they may realize

that we are trying earnestly and seriously and with all our might to improve and develop the agricultural interests of the State, and to promote the efficiency of the work done in the agricultural department of the State College, so that it will be a credit to the State and of advantage to every working farmer at home as well as to every scientific farmer in the Commonwealth.

DEPUTY SECRETARY MARTIN: Mr. Chairman, I am gratified that you have had the pleasure of looking into the face of Prof. H. E. Van Norman. It was my especial pleasure to introduce Prof. Van Norman at Troy, Bradford county, last November, where was carried on a three-days' demonstration work in the handling of milk and testing it by the Babcock test, as well as the actual process of butter-making. The thought that we want to impress upon your minds as members of the Board and as Chairmen of County Farmers' Institutes is, that we have in mind the fact that Prof. Van Norman has kindly consented, so far as his work at the State College will permit him, to join with us and to help us in this dairy demonstration work in the dairy regions and portions of Pennsylvania, and those of you who have charge of institutes in the various counties should bear this in mind and at certain times, when we find it convenient to hold a demonstration school in your county, confer with us, and arrangements can be made in the future.

The Secretary read a letter from Dr. D. J. Waller, of Indiana, Pennsylvania, which was referred to the Executive Committee.

MR. HUTCHISON: Mr. Chairman, I would like to ask for information? What committee makes up the list of these Consulting Specialists.

The SECRETARY: The Executive Committee.

MR. HUTCHISON: I think there should be added to that, the subject of Concentrated Feed Control. Should that be taken before the Committee or before this body?

The SECRETARY: That would be for the Board to decide.

MR. HUTCHISON: Mr. Chairman, Prof. Fuller is here with a well equipped laboratory, and I think such a committee should be created and have a report from him each year to this Board. The Credential Committee has not reported yet, therefore, I do not want to make a motion, because it might be presuming to do so; I think that some good member who holds over might make that motion.

The SECRETARY: It might be well to suggest that to the new Executive Committee that will be elected in a little while, and perhaps they may have some report to make on that subject.

MR. EDGE: Mr. Chairman, originally those Specialists were all nominated by the Secretary; that was the original plan. The Secretary nominated the Specialists to the Executive Committee and they either confirmed or rejected, as they saw fit.

The SECRETARY: I can only answer what the course has been since I have been Secretary of the Board. At the first meeting after I came into my place, the Executive Committee made the ap-

pointments and so it has been done ever since. I do not know whether that rule obtained before that time or not. Perhaps some of the older members of the Board can tell us how that matter was. It seems to me that the Executive Committee is entirely competent to do this work, and perhaps they can do it as well, if not better, than the Secretary.

MR. EDGE: I can readily see that you want to get out of the responsibility. I think it is a good thing to do if you can.

MR. FENSTEMAKER: Mr. Chairman, this is a very important question; one of the most important, and I move to refer it to the Executive Committee.

The motion being seconded, it was agreed to.

The CHAIRMAN: I see before me Dr. Conard; we should be pleased to hear from him.

DR. CONARD: Mr. Chairman and Members of the Board: I did not expect to be called upon, but I do feel like saying that we may congratulate ourselves in having with us a Professor of Dairying who is at our service and capable of giving us instructions that we so very much need. Probably that strikes me a little closer than it does some others. I live in a dairy district myself, and for the last few years, particularly, it has been my duty to educate, in a measure, a great many people in the handling of milk, particularly for city trade, people who have been educated principally in an opposite direction, so as to be in need of instruction. Their market has been of such a character as to favor the production of milk at a time it was not wanted in the city. The requirements of the market have been such, too, that it did not favor careful handling and did favor rather the improper handling, I think I might say, and to change the character of their market and the character of its requirements has been necessary, and the results I must say have been somewhat satisfactory, but I do feel the need of just what we are told we have and what I know we have in Prof. Van Norman, and as Secretary Martin has kindly offered to the State his services at dairy demonstrations, I think that Secretary Martin will hear from me very soon on that topic. I do not know of anything that can be of more service to us than just such demonstrations as have been alluded to. If we are only second now in the United States, as a dairy state, a little bit more effort, I think, will make us stand a little higher than that. It is true that the Philadelphia market is being supplied more from Pennsylvania than it ever was. The State of New Jersey has contributed very liberally to the Philadelphia market until very recent years, but the tendency now is for New Jersey to consume her own products. She is a truck-garden state, a large proportion of it at least, and she has consumed her own products largely of late. Little boroughs and towns all over the State of New Jersey are growing to such an extent that they can consume the most that is produced in their own neighborhood, so that Philadelphia has to look elsewhere for her supply. New York milk has been shipped to Philadelphia to a great extent, but for obvious reasons; that is not as it should be, and the trend now is to look to Pennsylvania for supplies. It has had a tendency to develop dairy industries in that par-

ticular section of the State. It is being developed and is going to be developed more and more. It is very gratifying to know that the State College is in a position to help us out.

MR. HUTCHISON: What would be your idea of establishing a condensed milk factory in a good farming district, but not convenient to a milk market?

DR. CONARD: I think the time is near when condensed milk is going to be used more and more. It is unquestionably true that the condensed milk market is going to grow, is growing and has grown. As a matter of profit to the purchaser of condensed milk, it would seem to me that they should be located in remote districts where it is inconvenient to ship milk or even butter to the markets. Condensed milk can be shipped anywhere wherever it is wanted, just about as well as any other product. There are two condensed milk factories near Philadelphia, one near Malvern and another one at Kennett Square. The first two are doing well; the latter, I believe, is not enjoying quite so much prosperity.

MR. HUTCHISON: What do they pay a quart or a gallon for the milk?

DR. CONARD: I do not know; their price fluctuates very much. I think Prof. Van Norman can tell you the price, perhaps.

PROF. VAN NORMAN: I am not able to give the information.

DR. CONARD: I think in the neighborhood of \$1.50 at the present time, but very much lower in the summer time; the price varies considerably.

PROF. SHAW: Mr. Chairman, I would like to ask the gentleman if he can give approximately the cost of transportation of condensed milk and butter.

DR. CONARD: No; I have not been in that line of work at all, but there would not be so very much difference in cost. Of course, condensed milk could be transported to greater distances. I think probably the cost of freight alone would not figure so largely as the inconvenience of refrigeration.

MAJOR BROWN: Mr. Chairman, I would like to say that in the town where I live, at Cory, they have a very successful condensed milk establishment. It is a financial success as an institution, and is also, I believe, a great benefit to the farmers.

Possibly the town in which I live may be so remote from the centers of the commercial world as to have that institution fit nicely in that locality, but I know something about the scheme which originated it.

The parties who broached the proposition went to the farmers around there and offered them an advance over what they were getting for milk or butter at the creamery. I forget now what that advance was, but it was a considerable advance, and the result was, that nearly all the farmers around there are bringing their milk to that condensory, and as I said before, it has been a successful enterprise. The products of the factory are largely sent to New York

and Pittsburg, and some considerable amount of it goes to the markets of other great business centers of the country, but as to that institution I know it is a success.

The CHAIRMAN: Now, gentlemen, we are ready to hear the report of the Committee on Credentials. Mr. Herr, the Chairman of the Committee, will present the report.

MR. HERR: I first wish to make a statement to the Board, that the terms of certain of the members we have made to expire in 1908 agreeably to the resolution that was passed at the meeting at West Chester, so as to even up the terms of the members of the Board, and have about one-third expire each year.

REPORT OF THE COMMITTEE ON CREDENTIALS.

The Committee on Credentials Respectfully Report That They Have Examined the Credentials of the Following Persons for Membership in the State Board:

Name.	Address.	Term Expires.
1. A. I. Weidner,	Arendtsville, Adams Co.,	1909.
2. R. M. Heyburn,	Ward, Delaware Co.,	1908.
3. A. J. Kahler,	Hughesville, Lycoming Co.,	1909.
3. Samuel McCreary,	Volant, Lawrence Co.,	1909.
5. I. A. Eschbach,	Milton, Northumberland Co.,	1908.
6. J. F. Seavy,	Seagerstown, Crawford Co.,	1908.
7. Matthew Rodgers,	Mexico, Juniata Co.,	1909.
8. A. P. Young,	Millville, Columbia Co.,	1909.
9. Geo. G. Hutchison,	Warriors Mark, Huntingdon Co.,	1909.
10. Chas. H. Mullin,	Mt. Holly Springs, Cumberland Co.,	1909.
11. Jacob S. Miller,	Friedens, Somerset Co.,	1908.
12. Dr. M. E. Conard,	Westgrove, Chester Co.,	1909.
13. E. R. Warburton,	Forksville, Sullivan Co.,	1909.
14. W. F. Beck,	Easton, Northampton Co.,	1909.
15. J. F. Boyer,	Freeburg, Snyder Co.,	1909.
16. J. S. Burns,	Imperial, Allegheny Co.,	1909.
17. Horace H. Hall,	Ellisburg, Potter Co.,	1909.

The Committee further report that the credentials of Mr. Horace Seamans, of Lackawanna county, not being in due form, we recommend that he be received as a member at this meeting with the privilege of presenting credentials in proper form to the Secretary.

In the case of the credentials of Watson T. Davis, of Bucks county, your Committee report that the credentials are not correct from the fact that they are not signed by the officers of any agricultural organization. Your Committee recommend that he be seated as a member at this meeting.

The credentials of Norris G. Temple, from the State Poultry Association, were received and your Committee refuse to accept the credentials of Norris G. Temple and decline to recommend that he be seated as a member.

The Committee still further report that we have examined the credentials of the following persons, representing agricultural organizations, and recommend that they be admitted to sit as advisory members:

Name.	Address.	Representing.
S. P. Hellman, M. D.,...	Heilmandale,	Lebanon Co. Ag'l and Hort. Ass'n.
Ira J. Light,	Lebanon, Pa.,	Lebanon Co. Ag'l and Hort. Ass'n.
John H. Bennetch,	Newmanstown, R. F. D. No. 1,	Lebanon Co. Ag'l and Hort. Ass'n.
E. S. Risser,	Lawn,	Lebanon Co. Ag'l and Hort. Ass'n.
Edward Shuey,	Lickdale, R. F. D. No. 1,	Lebanon Co. Ag'l and Hort. Ass'n.
John F. Boyer,	Freeburg,	State Horticulture Association.
H. A. Surface,	Harrisburg,	State Horticulture Association.
Enos B. Engle,	Waynesboro,	State Horticulture Association.
R. M. Elder,	Aspers,	State Horticulture Association.
Chester J. Tyson,	Floradale,	State Horticulture Association.
A. Roberts,	Adams Co. Agricultural Ass'n.

J. A. HERR,
R. J. WELD,
S. M. McHENRY,
M. M. NAGINEY,
M. N. CLARK,
Committee.

It was moved and seconded that the report be received and adopted as read, and that the members named in the report be seated as recommended. Agreed to.

MR. RODGERS: Mr. Chairman, I would like to add the name of Hon. W. C. Pomeroy, of Port Royal, who was elected to represent the Juniata County Agricultural Society.

MR. HUTCHISON: I would like to add the name of John T. Patton, as a representative of Grange No. 974, of Warrior's Mark, as an advisory member.

The CHAIRMAN: Shall these two gentlemen be received and accorded the floor as advisory members?

It was moved and seconded that the two gentlemen named be received, as requested, as advisory members and accorded the privileges of the floor; which was agreed to.

The CHAIRMAN: Now, then, gentlemen, we are ready to proceed to the election. I will appoint Messrs. Hutchison and Barnes as tellers. The first will be the election of Vice Presidents.

The nominations for Vice Presidents were as follows:

P. S. Fenstermaker, A. J. Kahler and S. M. McHenry.

It was moved and seconded that the nominations close; which was agreed to.

MR. HUTCHISON: I move that the Secretary be authorized to cast the ballot for the three gentlemen named.

The motion being seconded, it was agreed to.

The SECRETARY: I have the pleasure of casting the ballot as follows: For Vice Presidents, P. S. Fenstermaker, A. J. Kahler and S. M. McHenry.

The CHAIRMAN: I therefore declare the three gentlemen named duly elected as Vice-Presidents.

Mr. Fenstermaker will please come forward and assume his duties.

MR. FENSTEMAKER (in the Chair). Gentlemen of the Board, this is entirely unexpected, but my friend Hutchison there is something of a politician, and somehow or other politicians always get on top.

We hope, with your assistance, to get through with the business in a satisfactory manner, and we will at once take up the next regular order.

The SECRETARY: The election of an Executive Committee, I think, is the next in order.

The CHAIRMAN: The Executive Committee then will be the next in order; the Governor, I believe, is ex-officio the President of that committee. There are nine names for members of the Executive Committee.

MR. HERR: Are nominations in order?

The CHAIRMAN: They are.

MR. HERR: I nominate Mr. I. A. Eschbach.

The following gentlemen were also nominated: J. Newton Glover, of Union; H. G. McGowan, of Berks; George G. Hutchison, of Huntingdon; M. N. Clark, of Westmoreland; Dr. E. E. Tower, of Susquehanna; H. C. Snively, of Lebanon; Samuel McCreary, of Lawrence, and Dr. M. E. Conard, of Chester.

MR. HERR: I move that the nominations now close.

MR. EDGE: Mr. Chairman, you have only seven to elect.

MR. HUTCHISON. Now my friends, you have always been very kind to me and I will withdraw.

Mr. M. N. Clark also withdrew.

MR. HERR: I move that the Secretary be authorized to cast the ballot for the seven gentlemen who have been nominated.

The motion being seconded, it was agreed to.

The SECRETARY: In compliance with the motion just adopted, I cast the ballot for the Executive Committee as follows: Messrs. I. A. Eschbach, of Northumberland; J. Newton Glover, of Union; H. G. McGowan, of Berks; Dr. E. E. Tower, of Susquehanna; H. C. Snively, of Lebanon; Samuel McCreary, of Lawrence, and Dr. M. E. Conard, of Chester.

MR. HERR: The Advisory Committee is selected by the Executive Committee in their meeting.

The CHAIRMAN: Yes; that is correct. The next thing in order, I suppose, would be Unfinished Business, as we find it on the program. Is there anything you wish to take up?

The SECRETARY: There is no unfinished business at present that I am aware of.

The CHAIRMAN: If there is none, the next thing in order is Miscellaneous Business.

MR. CLARK: Mr. Chairman, does not the matter of fixing the next place of meeting come under this head.

The CHAIRMAN: I think that is under the head of New Business.

MR. HERR: Is it in order to select the place of meeting now?

The CHAIRMAN: I think it is, at the pleasure of the Board.

MR. HERR: Mr. Chairman, then I move that we proceed to fix the place of the next meeting of the Board.

The motion being seconded, it was agreed to.

MR. HERR: Mr. Chairman and Members of the Board: You will remember that at the meeting a year ago I recommended Lock Haven as a central place, where we could meet with the least expense, where the accommodations are excellent, and where we have our court house to meet in. I had quite a good many votes for that, but the Board decided to meet at West Chester. Now, I want to renew that motion, for several reasons: We have as good accommodations at Lock Haven as you will find anywhere, railroads center there, and it is not far from the State College. If you wish to make a draft upon the faculty of the State College for our institute round-up in connection with the Board meeting, we have opportunities of doing it. I want to state candidly, however, that I have been requested by Mr. Riddle, of Butler county, who is not here, to present the claims of Butler, and if the Board decides to take it west of the mountains, I shall be glad to favor Butler, but my impression is that we ought to meet at Lock Haven, and there will be no additional charges when we meet there. Before, we paid all the incidental expenses of the Board, I think, and I will guarantee that the prices will not be advanced.

The SECRETARY: I have a letter in my hand which I was asked to present to the Board. This letter is from our Brother W. H. H. Riddle, who seems exceedingly anxious that the next meeting should be at Butler.

MR. HUTCHISON: I have a similar letter from Brother Riddle, of Butler, in which he speaks of it being a beautiful town of 20,000 inhabitants. I am not presenting the place, but I will discharge the duty that he imposed upon me; the letter is similar to that mentioned by the Secretary.

MR. CLARK: Mr. Chairman, I would state that I also have a letter of a similar nature from Brother Riddle to which I call your attention as a matter of courtesy, which I cannot help but do, as he requests, and I, therefore, present this letter for your consideration.

MR. RODGERS: Mr. Chairman, I have had correspondence with Brother Riddle, stating the same thing and saying that he will make himself responsible that everything will be verified, and I would move that we meet there.

MR. SCHWARZ: Mr. Chairman, I want to hear from Mr. Martin on this question.

MR. NELSON: Mr. Chairman, a year ago I nominated Clearfield, and all that Brother Herr has said in regard to Lock Haven will apply to Clearfield. We have the best of railroad facilities, have one hotel, a new hotel, that will entertain a hundred members of this Board at \$2.00 a day, with a private bath in rooms, and with an assembly room in the building and all necessary committee rooms, and I will guarantee there will be no extra charges, and those rooms will be furnished free. The Agricultural Society has been invited there and I believe we can turn out the largest delegation of any county in the State. The institute work is booming up there, and our people would like to have the State Board visit them at Clearfield. The hotel is situated right across the street from the court house, but it will not be necessary to go across the street for an assembly room that will seat over three hundred people.

Mr. Sexton seconded the motion of Mr. Herr to meet at Lock Haven.

MR. McHENRY: I feel very much like supporting that motion to go to Clearfield, particularly on account of those baths; it would be so nice for members of the Board, but Brother Herr is located further down the river and I think there will be a little more water there. I want to second the motion of Brother Herr.

MR. MARTIN: Mr. Chairman, before offering other remarks, I will say that I am also in receipt of a letter from our good county chairman, Mr. Riddle, but I wanted to say explicitly that I have no choice of a place for holding this annual meeting; I have no personal choice. I have found in the past, with one exception, that this State Board is amply qualified and able to take care of the place of meeting, hence, whatever place in your wisdom you may name for this summer meeting, will meet with my hearty approval.

Clearfield and Butler each received a second.

MR. HUTCHISON: I move that we proceed to a vote.

The SECRETARY: Before proceeding to a vote, I want to second the motion to go to Clearfield.

MR. HERR. I want to say that I wrote to Mr. Riddle at once that I had committed myself to favor Lock Haven.

MR. HUTCHISON: We have had one round-up meeting at Lock Haven, but Clearfield has never had this honor, west of the mountains; and I would say concerning this hotel of Clearfield that it is a splendid up-to-date hotel. The court house is right across the street and they are good people out there, and they will treat you well.

The SECRETARY: I would suggest that the roll be called and each one vote his choice when his name is called.

The suggestion having been approved, the Secretary proceeded with the roll-call, which resulted in favor of Clearfield.

The CHAIRMAN: Clearfield having received the majority of the votes cast, I declare it as the next place of meeting.

MR. HERR: Mr. Chairman, no one place has received the majority, and I move that we proceed to another ballot.

MR. HUTCHISON: The Chair has already made his decision.

MR. EDGE: Has the Committee on Credentials reported?

The SECRETARY: It has.

The CHAIRMAN: We will withdraw that decision and take another ballot.

MR. HUTCHISON: Mr. Chairman, your idea is to have a majority of all the votes cast?

The SECRETARY: I will state that we have had no time to revise the roll since the report of the Committee on Credentials has been adopted, and whenever anyone whose name is called, who has not been re-elected, he will please not vote. I will call the roll this time by counties and then there will be no mistake.

MR. BLYHOLDER: I move you that the place receiving the highest number of votes be declared the next place of meeting.

MR. HERR: I would like to suggest that the place having the lowest number of votes be dropped from the list after the next ballot.

Motion seconded by Mr. Hutchison.

DR. CONARD: I will change my vote to Clearfield, if I have that privilege.

The CHAIRMAN: The motion before the house is to proceed to another ballot.

The SECRETARY: I think that Mr. Herr intended that that should be amended so that after this ballot the place receiving the lowest number of ballots be dropped.

Mr. Rodgers made the same motion just previously made by Mr. Herr.

MR. HERR: I move as a substitute, to drop the place receiving the lowest vote after the first ballot.

MR. BLYHOLDER: Mr. Chairman, I am willing to accept that. It seems to me that we are laboring at a disadvantage. We certainly have precedents establishing how the election should be conducted. I do not believe that we ever before required that the place should have a majority of all the votes cast.

MR. EDGE: Mr. Chairman, there is nothing in the by-laws that refers to the matter of our selecting a place of the next meeting at all.

The SECRETARY: In order that we may get out of the tangle that we are in, I think if Mr. Blyholder will withdraw his motion it will simplify matters. The original motion of Mr. Herr is capable of amendment.

Mr. Blyholder withdrew his motion.

The SECRETARY: The motion before us now is that we proceed to ballot, with the understanding that a majority of the whole number of members of the Board is sufficient to elect, and that after this ballot is taken, the place receiving the lowest number of votes shall be dropped.

This being agreed to, a ballot was taken, and the result announced by the Chair was as follows: Lock Haven, 5; Butler, 15; Clearfield, 17.

A second ballot was then taken, and the result announced by the Chair was as follows: Butler, 16; Clearfield, 21. Clearfield having received the majority, was declared to be the next place of meeting.

MR. HUTCHISON: Mr. Chairman, I move that we do now adjourn.

The motion was seconded and agreed to. Whereupon, the meeting adjourned to meet again at the designated hour as per program.

Wednesday Afternoon, January 24, 1906.

The hour of 1.30 o'clock having arrived, the meeting was called to order by the Chairman.

The CHAIRMAN: Dr. Funk, who was not present this morning, I see is here, and we shall be pleased to hear his report at this time as Pomologist.

The report of Dr. Funk is as follows:

REPORT OF THE POMOLOGIST.

BY DR. J. H. FUNK, Bowertown, Pa.

As State Pomologist it affords me pleasure to render such a favorable report to this honorable body on the fruits of Pennsylvania.

In former years the State of New York was recognized as the great fruit belt of the United States, but gradually other states forged to the front in strong competition. Among the most prominent in the old Keystone State, which in almost every business enterprise stands pre-eminently in the lead, her agricultural interests compare favorably with the great West. In coal and iron she stands in the front ranks, and a few years more of progress such as made in the last half-score years will place her in the lead as the great fruit-producing state, leaving her competitors far in the rear.

A few years back the southwest had a boom. We heard of large areas being planted, thousands of acres being put into apple and peach, and the owners looked forward with bright anticipation of amassing stupendous fortunes in a short time, and Ben Davis was to be the stepping-stone to the new realm. Air-castles were built that

towered to the skies. But the bauble has burst, their walls have crumbled to dust, failure has followed failure for a series of years, until hope deferred has made the heart sick, and the once enthusiastic planters have come to realize that unless fortune favors them they must put their land to other uses for which it is better adapted.

The past season will be recorded as one of very small crops, of inferior quality of fruit throughout the fruit-producing states, New York and many other states averaging less than twenty-five per cent. of a full crop. Pennsylvania alone, especially that portion lying between latitude 40 and 41, producing a good crop of every variety of fruit, commencing with the strawberry and ending with the apple.

When the farmers and fruit growers become educated and make the proper selection of varieties such as are adapted to their locality; ceasing to plant varieties of northern origin; planting only such varieties as originated in their own latitude or southward; knowing that the keeping qualities or life of the apple is shortened by being brought southward and proportionately lengthened by being moved northward; selecting and planting only such varieties as are of strong, robust habits; hardy in wood and bud, early, abundant, annual bearers of good sized fruit of bright red color and possessed of high quality; knowing that we cannot adapt the people to our product, but must produce such fruit as the educated tastes of our citizens demand, using as much care and intelligence in the selection as does the breeder of pure bred cattle; when they understand the nature and habits of the different varieties, their requirements as to soil location, elements of fertility, pruning, spraying, etc., an orchard can then be planted with far more assurance of success than with any of the cereals and with many times the reward. When orchards are thus planted and controlled by intelligent labor, muscle subservient to brain power, instead of trusting in signs and luck, then we will find Pennsylvania, and especially the central portion and southward, will be excelled by no like area on this green earth.

The average annual yield of apples in the United States is 176,000,000 bushels; annual yield in New York State, 24,111,000 bushels; annual yield in Pennsylvania, 24,060,000 bushels. Thus we see Pennsylvania lacks but 51,000 bushels of being the greatest fruit-producing state in the United States. If this branch was encouraged and fostered it would double the production in a few years.

The northern tier of counties, Susquehanna, Wayne, Lackawanna, Bradford, Tioga and others are especially favorable for apple production. With their thousand of acres of hillsides, which are bringing in comparatively little income, being often a taxable burden to the owner, could in a short time be made to blossom as the rose and bring prosperity and happiness to hundreds of discontented farmers. Hundreds of acres of land can be bought through any of these counties for \$10.00 to \$25.00 per acre.

Farmers are anxious to sell and try their fortunes elsewhere. Some farms are being abandoned, and unless the tide of prosperity changes and sheds her bright rays upon the community, it will be in the same deplorable condition as some of the farming districts of New England. Why is this? Because the present system of farming is unprofitable; the owners barely existing. Their children, to avoid the same continual grind, are anxious to rush to the towns and cities.

HOW CAN THIS BE CHANGED?

While attending farmers' institutes, I find the people are anxious for any information that will better their condition, and they take kindly to the idea of fruit raising and endeavor to obtain all the knowledge possible. But like all new departures, it takes careful handling to shed the proper amount of light. Yet I fully impress upon them the importance of going into it intelligently, letting them understand that success depends upon careful selection of varieties, fertilization, pruning and tillage. I believe I have, in the counties gone through, started the germ, that if it be properly nurtured, would convert these now almost useless hills into a veritable Garden of Eden.

But it is a deplorable fact that the great State of Pennsylvania which takes such kindly interest in nearly all of her industries, appropriating thousands of dollars for building up and maintaining them, has made no provision for the building up of the horticultural interests.

They have created the office of Pomologist, the emoluments of which is honor, empty symbols of sounding brass, for which the incumbent is supposed to devote days of his time answering hundreds of long letters of inquiry, furnishing his own stationery and having the pleasure of paying postage from his own pocket. Why is there not a Department of Horticulture or some provision made that the Pomologist can do honor and justice to his office. When the needy ask for advice why should they be turned down for lack of funds, when the banks are speculating with millions of State funds.

THE PEACH.

It is only within the last decade that Pennsylvania has gained any prominence in the production of this most delicious of all fruits. Maryland and Delaware were looked upon as the great peach-producing states, but a new era has come and Pennsylvania steps to the front as a peer to all other states in producing in quantity and quality, second to none and superior to the majority. Peach orchards are being planted in nearly every part of the State. There are many failures as this is a fruit that will not thrive under neglect. But where planted and intelligently cultivated they are bringing their owners princely incomes.

The peach requires different treatment from the apple and pear, being more tender, more subject to fungus diseases, requiring more cultivation, more pruning, less nitrogenous and more mineral elements of fertility, but space does not permit to enter.

THE PEAR

Is holding its own as a profitable crop in Pennsylvania. I am sorry that a great many of the finer pears are being dropped from the list, from various causes, and the oriental varieties are superceding them, being less susceptible to insect depredation, more productive, consequently more profitable. I feel that the man who has the courage to set out a Bartlett pear orchard and tend to it intelligently will have a bananza in a few years.

PLUMS.

This crop is not giving universal satisfaction. The fine European varieties no longer thrive and produce as they did a few years back, owing to curculio, black knot and fungous diseases. The American varieties do not have the good qualities to ever become a favorite dessert fruit. The Japan varieties are not fulfilling expectations, being less hardy in tree, short-lived and fruit poor in quality, they will never fill the place of the prunes and gages of the past.

CHERRY.

This fruit is not being so extensively planted as it should be, and the supply is becoming shorter yearly, especially of the sweet varieties. This seems owing to the unhealthy condition of the trees, very few surviving bearing age. The sour varieties seem to do well, bear heavy crops and sell at very remunerative prices.

SPRAYING.

This is one of the essentials of successful, profitable fruit raising, and the owners profits are measured by the attention he gives his orchard. With the endless varieties of insect foes and fungous diseases that infest every variety of fruit, spraying several times a year has become so necessary that the man who expects to raise fruit without spraying is a back number, and will soon be crowded out of the business, as the citizen of to-day has educated tastes that call for clean, perfect, high colored fruit of exquisite flavor and this can be obtained only by spraying.

HOW OFTEN MUST WE SPRAY?

For good results three times, and for best results four times: First, with lime, sulphur and salt, while trees are dormant; second, with Bordeaux mixture and an arsenite immediately after bloom drops; third, about ten days later with the same material; fourth, about the beginning of August. These four sprayings, thoroughly done, with a power that will maintain a uniform pressure of 100 pounds will be a guarantee of clean perfect fruit.

THINNING.

This is another essential for fine, large, perfect fruit of high quality. There is no other one thing, except spraying, that gives such satisfactory results. It does more, it adds longevity to the tree and makes it an annual bearer.

SAN JOSE SCALE.

This pest is on the increase and the efforts thus far made have had but little effect in holding it in check. Occasionally we find a man who, by determined and persistent fighting, has held it under control and has his orchard in good condition, while his neighbor who has apparently been using the same means has no success whatever, the scale having taken entire possession, defying all his efforts and his orchard is in a dying condition, being only a matter of a short time until the battle is over and he is out of the business. This causes us to pause and consider wherein the difference lies. There must be a cause and I feel safe in saying that there are two causes of failure:

The first being the operator not understanding his business and not having the proper appliances at hand has failed to get the combination desired. A good chemist takes no chances; he makes sure of the purity of his materials. He weighs out the exact proportion of each ingredient that is required to form a new compound, knowing that certain elements having a strong affinity for other elements combine with them, thus forming new compounds, but always in fixed proportions. For instance, water may be taken from a mountain spring, from artesian well, or from the depth of the ocean and each contain exactly the same proportion of oxygen and hydrogen. They may be impregnated with foreign substances, but the vehicle, water, is always the same. The air we breathe always contains the same amount of nitrogen and oxygen, even though it be loaded with poisonous gases. So in the preparation of lime, sulphur and salt, certain manipulations are necessary. You cannot form bysulphide of calcium by simply mixing together proportion of lime and sulphur. You must have heat and moisture and the length of time necessary for the chemical change depends upon the intensity of the heat.

One or two well conducted orchard demonstrations, using the best modern appliances that practical science has devised for the preparation and appliance of the material, conducted by a thorough practical man who knows when the preparation is right, will be more effectual in educating the farmer and fruit grower than fifty demonstrations improperly conducted in the same territory and the expense less.

Two years back I had the pleasure of addressing this honorable assembly on the San José Scale. I then recommended public orchard demonstrations, but had in mind a thorough up-to-date outfit. The United States might as reasonably expect to cope with some strong foreign power who is fully equipped with the heavy armored vessels and powerful guns of modern warfare, by using the old flint-lock gun and wooden vessels of Revolutionary times as can the fruit raiser expect to subjugate and hold under control the most powerful insect foe that ancient or modern times has ever had to combat. It is a fallacy for us to attempt to teach the farmer to prepare the lime, sulphur and salt in small kettles or dripped over an open fire, when we know that intense continued heat is necessary to bring about the chemical change and without this all labor and money is lost.

You may argue, we must come down and meet the farmer on his own grounds, that he may use such implements as he has on hand. Why does not the same farmer cut his grain and grass with the cradle and scythe and save the heavy expense of the reaper and mower? Why does he use the cream separator, feed from the silo and adopt other modern methods? Because practice and science tells him he must do so or drop out of the business. Can we as practical fruit raisers, as well as scientists, who are looked upon as teachers afford to come down to this level and leave a trail behind us marked by utter failure. Our reputation, the good of the cause, will not permit it. We have a foe to fight, the most subtle, the deadliest one that requires the very best intellect and implements of warfare to control. Then let us thus equip ourselves instead of holding demonstrations at every little out of the way place that no one can conveniently reach. Select some suitable orchard of fair size, convenient to railroad station, advertize for at least a two-day demonstration, go there with the most complete outfit obtainable,

prepare and apply continually that all comers and goers can become thoroughly and practically familiar. Spray at least one or more acres that it may stand as a monument or finger-board pointing the road to success.

Having, as I believe, the most thoroughly equipped plant in the State, perhaps in the United States, I held a public demonstration on December 12, in the Paragon orchards in Boyertown, where, in the presence of at least 150 prominent fruit raisers from six different states, we prepared several batches of 100 gallons each of lime, sulphur and salt, cooking by steam, furnished by a 15-horse power boiler with best improved methods of steam distribution, obtaining a perfect combination in 35 to 40 minutes. Full instructions were given during the time of preparation. In this plant, everything is done by gravity system, avoiding all the disagreeable and laborious parts. At this demonstration everything was done to a nicety as far as preparation of material was concerned, being free from all sediment, and the sprayer worked to perfection; no clogging of nozzles from start to finish. But the application was not as it should have been. Those who run the sprayer looked more to the display of the machine and its power, than thoroughness. Ten nozzles being used on two lines of hose, whereas for thorough work more than two nozzles on each hose is a waste of material. Can we control this enemy? Yes! Lime, sulphur and salt properly made and properly applied is thoroughly effectual.

OTHER INSECT PESTS.

Oyster shell bark louse is especially plentiful and destructive in Centre, Clinton and Sullivan counties; also scurfy scale. I also find San José Scale in every county I have been in, except Tioga; but not having had the opportunity of examining orchards very thoroughly there it may also be in some orchards. Codling moth is very plentiful, rendering it almost impossible to find fruit free from worms in those counties where but little spraying is done.

FUNGIOUS DISEASES.

Scab and other fungous diseases is also doing serious damage to both tree and fruit where there is no spraying. The "yellows" is doing considerable damage all over the State, and nearly every farm home has trees in the last stages of decline from this scourge, which has thus far defied all science.

I also found one orchard in Franklin county with several trees affected with what is known as "little peach." This, like the "yellows," has no known remedy except cutting out and burning.

During the reading of his report, Dr. Funk made the following remarks: Right here I had something called to my attention that I did not embody in this paper; it has been recommended spraying the peach in the Fall with the lime, sulphur and salt; I have heard a few complaints that where they have been sprayed in December that the buds on the most of these are now dead, so that it would seem that we have to leave the salt out in spraying the peach, as it is the chlorine in the salt that will do the damage.

The CHAIRMAN: What shall we do with this report, gentlemen?

On motion duly seconded, the report was adopted.

MR. NELSON: I would like to ask the Doctor if he knows whether the scale insects are carried by bees or not?

DR. FUNK: I think any insect or bird that flies will have a tendency to carry them; the bee seldom touches anything but bloom, but the robin and the sparrow are the two great carriers; they carry more than anything else.

The SECRETARY: I would suggest that we go through with all the reports on the program and then if there are any questions, let them come up after the reports are all in.

The CHAIRMAN: The next report on the program is from the Committee on Live Stock, D. A. Knuppenburg, Chairman.

The report read by Mr. Knuppenburg, is as follows:

REPORT OF THE COMMITTEE ON LIVE STOCK.

BY D. A. KNUPPENBURG, Chairman.

The reports of the United States Department of Agriculture show a very great increase in the value of farm animals during the past few years. This increase of value has been accompanied in Pennsylvania by an increase in the number of dairy cows. There is also a larger number of horses and mules in use in Pennsylvania than ever before in the history of the State, even when street cars were drawn by horses. The value of the domestic animals of the State, including poultry, etc., animals in towns and cities as well as those on farms, amounts to fully \$150,000,000. Parts of the State are splendidly adapted to rearing horses and the experience of many farmers shows that horse raising may be conducted profitably.

Pennsylvania is probably the greatest horse and mule consuming state in America, and the market for good horses of all classes is as good here as it is anywhere in the United States. Unfortunately, however, this industry is by no means strong. It cannot become strong until horse raisers show better appreciation of the demands of the markets and use better stallions. It is a deplorable fact that there is in service in this State a great many stallions of mixed and cross breeding and that are afflicted with hereditary defects of conformation and are unsound. That such stallions are used is a very serious reflection on the judgment of the horse breeders of the State. Pennsylvania cannot take high rank as a horse producing state until there are available in all breeding districts, better bred stallions of high quality. Some of the Western states have inaugurated a system of licensing stallions and so far as this plan has been carried out it appears to be working satisfactorily and is improving the quality of the horse stock.

The horses of Pennsylvania are constantly threatened by glanders, as a result of the extensive infection of horses with glanders in some

of the Western states. Horses coming from such states may at anytime introduce this disease. There is also a great deal of danger with relation to second-hand horses from New York City, for in that city glanders prevails very extensively. The State Live Stock Sanitary Board has thus far been able to control important outbreaks of glanders before they have gained much headway. In order to do this it is necessary that the Board shall have reports of the early occurrence of this disease. In fact, a recent state law makes it compulsory upon owners of animals to report outbreaks of infectious diseases that may exist and be of serious damage to a community.

The mule can be raised at less expense and less risk than the horse. The demand for him being just as great and at a better price, no one need fear overstocking the market with good heavy mules.

Pennsylvania continues to import from other states, chiefly from Ohio and New York, about 15,000 dairy cows every year. The \$600,000 that is paid for these cows might be had by farmers in parts of Pennsylvania that are admirably adapted to the rearing of cattle, and where the dairy industry is now highly developed. I have discovered where milk shipping comes into vogue in a community, all other branches of agriculture have a tendency to decline until finally the sole income of the farm is derived from the sale of milk. Nothing is grown excepting for the use of the cow stable, and even the cows themselves, and often times the butter used in the farm house, is purchased.

Such a state of affairs tends to make farm life less attractive than when there is a greater diversity of interest, and in districts where this system prevails there appears to be an increasing tendency to turn the farm over to tenants. The addition of swine, poultry, a small flock of sheep, a colt or two all tend to create interest and the result is more satisfactory to those thus engaged.

The diseases that have long been in the State have continued to prevail, although to a less extent than formerly. Abortion of cows is a disease that is causing very great losses in breeding herds, and for which there should be a better means of controlling. The State Live Stock Sanitary Board is anxious to take up the study of this disease and also of calf cholera, a very fatal and destructive malady. At present, however, the full resources of the Board, so far as they are available for investigation, are being devoted to the development of vaccination against tuberculosis.

Great success is attending this work, and already vaccination is being used under the direction of the State Live Stock Sanitary Board in a number of important breeding herds. The plan is to make this process generally available just as soon as sufficient knowledge is at hand to show to what extent it may be relied upon under different systems of herd management. Loss in Pennsylvania the last year from disease is two per cent. The Federal Meat Inspection Statistics, which cover about 6,000,000 cattle a year, show that the condemnations on account of tuberculosis are increasing from year to year at a rate that must cause anxiety to every one interested in American agriculture.

An official report declares that for years to come there will be more money in sheep than in any other agricultural product and that the Pennsylvania farmer is in position to profit by this condition. The reason why sheep raising is to be found so profitable is

that flocks not only of Pennsylvania but of the world are declining at an alarming rate. Pennsylvania State Veterinarian, Dr. Leonard Pearson attributes this decrease in Pennsylvania largely to ravages of dogs. As the State becomes more thickly populated, more dogs are kept in the same centers of population, about industrial establishments, coal mines, summer resorts, worthless country dogs, etc.

The loss of the flocks to the world from various causes, in the last thirty years shows a loss of no less than 93,000,000 head, an average of more than 3,000,000 a year. It may thus be seen what an immense field of enterprise is open to the farmers of Pennsylvania in a single agricultural product. Dogs have ravaged the flocks of Pennsylvania to a very discouraging and disastrous extent. It has not yet been possible to secure effective legislation on this subject, and it is one that merits the earnest attention of the State Board of Agriculture. Heretofore, there has been several general discussions on this subject, but the discussions have not resulted in definite action. If the strength of the Board of Agriculture could be brought to bear in favor of a given bill, it is likely that the passage of the bill could be obtained at the hands of the Legislature.

No one should be permitted to keep a dog that is not worth paying taxes on. The dog tax should be more carefully assessed, and the penalty for non-payment should be the destruction of the dog. It might be well for the State to inaugurate a system for licensing dogs as is now done in some cities. In this case the dog has to wear his license in the form of a metal tag attached to the collar.

Poultry may be raised with the greatest economy on the farms of the country where there is unlimited range and exhaustless supply of insects and worms, and an abundance of seeds and grains going to waste which poultry alone can utilize. When fenced away from the garden and flower beds, it does little damage and causes scarcely any annoyance on a farm. Gapes in chickens are the greatest drawback and the poultry raiser is anxiously looking for an effectual remedy.

Pennsylvania has 1,200,000 swine. Where good sanitary conditions exist, with plenty of clover, milk, charcoal and good common sense, energy and thrift, there is little doubt but swine are profitable and little troubled with disease. It is much better and cheaper to prevent disease than to cure it when once contracted.

On motion, duly seconded, the report was received and placed on file.

The CHAIRMAN: The next on the program is the Report of the Veterinarian, Dr. Leonard Pearson, of Philadelphia.

Dr. Pearson not being present, his number upon the program was passed.

The CHAIRMAN: Mr. Nelson, who is Chairman of the Committee on Apiary, prefers to report to-morrow morning.

Dr. Edward Patrick, of West Chester, Pa., not being present, his number on the program was passed.

Mr. McHenry, third vice present, at this point took the Chair.

The CHAIRMAN: Next upon the program is the Report of the Committee on Roads and Road Laws, P. S. Fenstemaker, Chairman. We will now hear from Mr. Fenstemaker.

MR. FENSTEMAKER: Mr. Chairman and Members of the Board: I have an apology to offer to the members of this Board. I would like to have this report just one-half as large as it is, but it is such an important question, one of the widest questions I think in our State, that I have not been able to keep my paper within the limits I would like, and whenever you get tired, let me know and I will quit right there.

The following is Mr. Fenstemaker's report:

REPORT OF THE COMMITTEE ON ROADS AND ROAD LAWS.

BY P. S. FENSTEMAKER, Chairman.

Your Committee would report that there are now among the statutes of Pennsylvania road laws which embody many of the features recommended by this body. We believe that if those upon whom rests the responsibility of carrying out its provisions will faithfully do their duty, a new era of road improvement will have dawned upon our Commonwealth. We find, however, that the people are hesitating and uncertain as to how to proceed. No one seems anxious for the position of township supervisor, and for once this office will have to seek the man.

We have heard of townships where meetings have been held resolving that they would continue upon the same plan as heretofore, and pay no attention to the new law. The acts of 1905, repealing former laws, all proceedings under such circumstances will be illegal, and such as will follow this plan will soon find themselves in a dilemma. The success or failure of road improvement under these new laws, depends principally upon the *personel* of the men selected for position of township supervisor. Unless the best men in every township interest themselves sufficiently to put in operation the provisions of these acts of the Legislature, the taxpayers as well as those having occasion to use the highways will be in worse shape than ever before.

As to the State aid reconstruction acts, the State Highway Commissioner, Joseph W. Hunter, reports that this department has received five hundred applications, aggregating nearly one thousand miles of road, about two hundred miles completed, and surveys made on many miles more. The State Highway Department claims to have found less objection to the State aid system. The opposition decreasing in proportion as the public becomes familiar with the provisions of the law and with the character of the roads built by authority of the law. That townships which first applied for State aid have been so well pleased with the results that they have sent in numerous additional applications.

Through information received from different sections of the State we find that many differ with the State Highway Department in several particulars, as to the results of the State aid reconstruction laws.

It appears that in rural districts the want of information and lack of interest in road improvement, with the low valuation of real estate, causes these people to hesitate and halt before applying for State aid, especially when reconstructed roads are reported to have cost from two to five thousand dollars per half-mile. For with many more miles remaining untouched for many years to come those not having any benefits of the improvement will hardly tax themselves for another's benefit.

The result is that the people living in strictly rural townships will hardly become beneficiaries of the State aid. They put in no application, and the roads adjacent to cities and towns are put in good condition, enhancing the value of land near cities and towns, while the rural roads will remain in about the same condition as heretofore.

Suburban communities are availing themselves of the State appropriation, and from present indications will get the largest share of the road fund. This result is also brought about through natural conditions to a certain extent. The principal roads near cities and large towns and railroad stations are being the most traveled in nearly all communities, and are naturally the ones on which to begin reconstruction.

Now in order to have sufficient funds for road improvement so that the strictly rural townships, which are at present taxed to the limit, need not pay the proportion of the cost as at present, might it not be well to have an investigation of the taxation of railroads, oil, telegraph, telephone and trolley lines, as to the valuation and other questions. These interests should pay the same proportion of taxes as is paid by other property holders. Another means of assistance in road improvement could be secured by compelling our thousands of convicts to work on the highways instead of competing with honest mechanics in the different trades. These convict laborers could be guarded by the recently organized State Constabulary thereby making this organization useful as well as ornamental.

In view of the fact that for generations to come there will yet remain many highways unreconstructed in the rural districts, and that as the State aid fund should benefit all sections of the State regardless of their ability to pay their share towards macadamizing under State supervision, we recommend that the pro rata share of each township not applying for State aid, and which under the present laws reverts back to the general fund, be, instead, allotted to all such townships upon the same plan as now is the school appropriation, and to be applied for the betterment of their highways, with certain restrictions, and on a plan of operation similar to that introduced by the Mapes Good Road Club, of Middletown, New York.

This system of road improvement appears to be the next best method to the macadam and at about one-thirty-fifth the cost. We consider it of such merit that it is included in this report, and with the hope that a copy of the same may reach every township supervisor in the State. The plan of operation is as follows: The first step is to stake out the work by making a light furrow on each side of the proposed road-work 12 to 16 feet apart, according to the width of the road. Next put the wheel of the road machine in this light furrow, hold the point of the blade firmly down in place, remove every

stone which the point strikes and work down and out, until enough dirt is secured to bring a good crown to the center of the road and a good gutter on each side, making suitable outlets from all low places in the gutter. On portions of the road with proper care in honing down after each heavy rain, and raking out loose stones this will be sufficient, other portions will need a little gravel or shale along the crown of the road. A cubic yard hauled on a twelve-foot wagon is enough for the worst places by dumping in a full load in a place, and in other places a half or a third of a load in a place will finish the crown. Grading with the machine should not cost more than twenty-five dollars per mile. Hauling gravel on the crown of the road not more than forty cents per cubic yard. This makes the cost only two hundred dollars per mile where a full load of gravel is placed on the crown of the road all the way.

The secret of success of such a road is the after-care. After the first rain such a road will become cut up by passing teams and vehicles, forming a hard crust as it dries. Before this becomes too hard, hone the surface perfectly smooth and true with a light hone about five to six feet long. One man and a team can hone off a piece of road in this way if he understands his business, at a slight cost. He should stand on the hone, and guide it by stepping from one end of the hone to the other as the occasion requires. This should be repeated after every heavy rain. Now rake off any loose stones and you have a beaten track on the crown of the road over which an auto or bicycle will roll as smoothly as on the best macadam, and on which you can drive a clean buggy an hour after a summer rain shower without having to avoid mud holes. The only care needed on such a road will be to sprinkle a very little gravel shale on even good hard pan right on the center of the beaten track occasionally according to the amount of wear on the road. Keep the gutters from filling by throwing the stuff out of them away from the road instead of back into it.

A road so built and kept is built on scientific principles. The beaten track on the crown is a hard crust almost impervious to water. Using the hone frequently keeps the upper surface of the crust so smooth that rains flow quickly into the gutters at the side. A road thus built and at this cost has stood the test for over two years, and is still in almost perfect condition. The thawing of last winter's frost seemed to have no bad effect on it last spring, though formerly it had often been almost impassable.

This hone which is used for scraping roads is a plank twelve inches wide, three inches thick and five or six feet long, to one side of which is bolted a plate of steel for a cutting edge. It is then stood on edge and a pole fitted to the front with braces arranged so that it will draw a little diagonally across the road. A pair of plow handles may be fitted back of the scraper by which it can be guided, or weighted by the driver standing on it.

With State aid the first cost of such a road is within the means of most rural townships.

RECOMMENDATIONS.

The recommendations in last year's report as to the encouragement of the use of wide tires on the public highways are renewed, as are also the same as to penalty for hauling of heavy loads with narrow tires.

Our Legislators in the session of 1905 should be highly commended for the enactment of laws placing restrictions and responsibilities upon those having charge of auto vehicles upon the public highways.

We recommend, as an additional safe-guard, that this act be amended so that all such persons being above the age of eighteen years be compelled to pass a satisfactory examination as to their capabilities of running such machines and prove their ability of controlling the same before some legally constituted board of examiners before being given a license.

The present agitation of the question for the enactment of laws permitting trolley cars or lines to carry freight is one which should have our serious consideration. For unless such a law is properly constructed its operation may prove a curse instead of a blessing.

The term freight is entirely too sweeping, and unless there is specifically defined what class of articles this shall consist of, we may, by our blind encouragement of this project, be the means of making our already crowded and dangerous highways upon which trolleys are running, still more dangerous and almost impassable for the horse conveyances.

In many sections of the State the tracks of trolley lines are almost exclusively upon the public highways, and to still further encumber them with additional tracks and with trains of cars containing coal, lumber, ores, oils, explosives and such other articles as are included in the term freight would be the height of folly.

To bring up a discussion on this very important question, we would recommend that this body pass suitable resolutions, and through our Committee on Legislation, oppose all bills brought before the Legislature permitting trolley lines to carry freight, that do not limit the articles to be carried to the products of the orchards, dairy, poultry, market gardening, etc., and what is known as light freight and express packages. Also that such trains shall not consist of more than one car, and such cars to be of same style and size as are in use at the present time.

Your Committee would request that all of the aforesaid recommendations receive the consideration of the Committee on Legislation.

On motion duly seconded, the report was adopted.

The CHAIRMAN: The next number on the program, is the Report of the Committee on Wool and Textile Fibres, D. S. Taylor, Chairman, of Raccoon, Pa.

Mr. Taylor then read his report which is as follows:

REPORT OF THE COMMITTEE ON WOOL AND TEXTILE FIBRES.

BY D. S. TAYLOR, Chairman.

I beg leave to submit the following report on wool and textiles. In looking over the reports for the past five years, we do not find recorded any report from this department. In order to make a re-

port on the wool industry of the State, it is but fitting that we take with it the sheep industry also, as without the sheep we cannot grow the wool. We find from statistics, the State of Pennsylvania had on January 1, 1905, 895,982 sheep, valued at \$3,415,394, average price per head of \$3.81; and in the United States of America on January 1, 1905, 45,170,423 sheep, valued at \$127,331,850, average price per head of \$2.82.

The wool product of Pennsylvania for 1904, was from 850,000 head of sheep, producing 5,100,000 pounds washed and unwashed wool, 2,448,000 pounds scoured wool, there being .52 per cent. of shrinkage; average weight of fleece, 6 pounds. The wool product of the United States in 1904, was from 38,342,072 head of sheep, 249,783,032 pounds shorn, washed and unwashed fleece, 42,000,000 pounds pulled wool, 291,783,032 pounds of wool produced in United States in 1904.

Scoured wool: Pounds, 95,795,147 fleece or shorn wool; pounds, 28,140,000 pulled wool; 123,935,147 pounds scoured wool.

Per cent. of shrinkage: In fleece or shorn, 61.6 per cent.; in pulled wool, 33 per cent.; average weight of fleece, 6½ pounds.

We find the number of sheep in Pennsylvania: In 1903, 850,000 head produced 5,100,000 pounds wool valued at \$1,297,440; in 1904, 850,000 head produced 5,100,000 pounds wool valued at \$1,419,480; in 1905, 850,000 head produced 5,100,000 pounds wool valued at \$1,542,240. The increase in the value of the 1904 over 1903, \$122,040; the increase in the value of the 1905 over 1904, \$122,840.

The average value per scoured pound: October 1, 1903 was 53 cents; October 1, 1904 was 58 cents; October 1, 1905 was 63 cents.

It appears the number of sheep and the average weight of fleece, have changed but little in the past three years, but the value per scoured pound has increased. It is evident the sheep breeders in Pennsylvania are breeding for more wool and less oil or grease in the fleece. In years past the sheep-breeder and wool grower, especially the fine wool breeder, bred for weight of fleece alone and did not keep in view the size of sheep. The result of which was a heavy oily fleece and delicate sheep. The fleece would loose much more than 60 per cent. in scouring.

The tendency in the sheep and wool industry in the western part of the State, is to grow more wool and less oil in the fleece. And as mutton is a good price, to produce a large sheep, smooth in body, and will produce a good long, medium fine fleece of wool. The sheep weighing 110 to 120 pound at 2 years old in April with the wool off. The average weight of fleece being about eight or nine pounds.

This grade of wool in our county the past season sold at 33 cents and 35 cents per pound (brook washed).

The wool industry in my county (Washington) is fast decreasing. Twenty-five years ago, the county produced more and better fine wool, than any other county in Pennsylvania. Then every farm was stocked with fine woolled sheep, about three sheep per acre, besides some horses, a few dairy cows and hogs. Some twenty-five or thirty years ago, two young men in our part of the State emigrated west, going into the State of Kansas, taking with them a choice lot of fine wool sheep from the western part of the State of Pennsylvania. They kept the sheep for over a year, shearing them, then they shipped the wool to Pennsylvania to be sold. It was in a wool house in a town in Washington county and on examining the wool,

good judges of wool would hardly believe, when told that the wool was grown on sheep, bred and raised in Western Pennsylvania. The length of staple was much shorter and the wool was full of a gray sand which colored it. This wool could not be sold for the price which it would have commanded if it had been grown in Western Pennsylvania. So it appears that parts of Western Pennsylvania are well adapted to growing good wool.

But from present appearances in Washington county those engaged in the sheep and wool business will have to direct their attention to some other business. With the development of the gas or soft coal it is bringing into the western counties of the State, a population of miners and with that population about two hungry, worthless dogs per family, the owners of which are moving from one mine to another and do not pay any tax on the dogs or if they remain long enough in one place, to have a tax assessed against the dogs, the collector is unable to collect it as there is nothing he can levy on unless it would be a house full of ignorant children. And the result is we do not get any revenue from the owners of a majority of the dogs to pay the loss sustained by the flock-master for his loss. In our county in 1904, the dog tax collected was \$5,656, but this was insufficient to pay the loss to the flock-masters.

We say, if the sheep-breeder and wool-grower cannot have better protection to his flocks from dogs by better legislation in the State of Pennsylvania, they will be forced to give up the business of breeding and growing sheep and wool.

Mr. Taylor called attention to the fact that he had samples of wool upon the table, representing wool from various kinds of sheep, each sample tagged to show from what kind of sheep it came, which he invited any of the members present to examine.

On motion, duly seconded, the report of Mr. Taylor was adopted.

The CHAIRMAN: The next number on the program is entitled "When Shall We Leave the Farm?" by Mr. E. E. Chubbuck, of Rome, Pa.

The following is the paper read:

WHEN SHALL WE LEAVE THE FARM?

BY E. E. CHUBBUCK, Rome, Pa.

It is with much hesitation that I even attempt to address this audience, but I have been so impressed with certain conditions that I venture to present a few thoughts.

You are all familiar with the fact that throughout the New England states, as well as our own and adjoining states, there is a vast number of rented and abandoned farms. In a certain village in New England an abandoned church lifts its spire among a cluster of abandoned homes. The vacant store keeps company with the empty blacksmith shop. The silent street hears no footfall, and

the neglected fields are left to the birds, the bees and the briars. Where are the children of these homes? Gone to the city. The fathers and mothers have either gone to the city of the dead or lost heart and left the home that could only tell of past joys and gave no promise for the future. The thought I wish to call attention to is—Shall we leave the farm? Shall we train and educate our children for the farm or fit them for other walks in life? If we wish to make them dissatisfied with farming as an occupation I know of no better way than to inculcate in their minds the idea that of all men on earth the farmer is the most oppressed.

I believe two erroneous ideas of the farmer is prevalent. One is that the farmer is a little inferior to every other rank in life. The other is equally untrue and fully as dangerous to our boys and girls. It is the idea set forth from the picnic platform, etc., namely: That the farmer is the noblest work of God; only till the soil and you will in some way become imbued with every virtue known to mankind. They throw a halo around his rough garb and uncouth manners. Now I believe we must teach our children that a man is a man, be he farmer, lawyer, merchant or priest. That a man is no worse for being a lawyer nor no better for being a farmer, no worse for being a poor man nor better for being a rich man. How better can I illustrate this than by quoting Robbie Burns:

"What tho 'on hamely fare we dine,
Wear hodden-gray, and a' that;
Gie fools their silks, and knaves their wine
A man's a man, for a' that!
For a' that, and a' that,
Their tinsel show, and a' that;
The honest man, though e'er sae poor,
Is king o' men for a' that!

"Is there, for honest poverty,
That hangs his head, and a' that?
The coward-slave, we pass him by,
We dare be poor for a' that!
For a' that, and a' that,
Our toils obscure, and a' that;
The rank is but the guinea's stamp,
The man's the gowd for a' that!"

When we have taught them these things we have instilled into their minds some of the fundamental truths underlying a useful life.

I see no reason why a farmer should not look as well as other men. His work should give him a fine physique. Overalls and heavy boots are well adapted for the plough field and barnyard, but while I have often perceived a strong odor, I have never discovered a halo about them. Some farmers seem to have such an exalted sense of the greatness of their calling that they deem it unnecessary to pay the slightest regard to their personal appearance and then feel injured that others could not see through the two weeks beard, uncut hair and every day clothes and recognize their great worth of character, but preferred another simply because he had "more style." The boy of to-day to make a success on the farm needs all that the successful merchant needs. Give it to him and what can the town offer better than the farm. The clerk must work long hours in the store. He can work just as long as he wishes on the farm.

The clerk may have a greater money income, but his expenses keep apace, he must be subject to the will of other men but the in-

dependent farmer executes his own plans, at the end of the year the clerk has paid his assessment on his life insurance policy and the farmer has made a payment on his farm.

The girls, who should stay with their parents and be educated and trained to become cultured women and makers of homes, attracted by the wages and seemingly easy life of the city stores and offices, leave home before they have learned even the rudiments of good housekeeping, and if in time they form attachments and attempt to make a home, their reluctance to let anything come into their life that will confine them at home and their meager knowledge of the essentials necessary to the making of a home, namely, the care of a house and the proper preparation of food, soon bring about discord and the end is too often, the divorce court. For with Owen Meredith we may say:

"We may live without poetry, music and art;
We may live without conscience, and live without heart;
We may live without friends, we may live without books;
But civilized man cannot live without cooks.

"He may live without books,—what is knowledge but grieving?
He may live without hope,—what is hope but deceiving?
He may live without love,—what is passion but pining?
But show me the man that can live without dining."

The trend of educators and of many periodicals have been to encourage the education of young women so that they may earn an independent living; but it has worked for evil instead of good, inasmuch as it has unfitted them for home life, because of impaired health and love of dress and excitement. The young man must compete with cheaper female labor and accept such wages as will not justify him in asking the girl of his choice to give up her independent life and share such a home as he can provide. The result is unnatural, and detrimental to good morals. It seems to me that one reason our boys and girls are so ready to leave the farm, is that we give so little attention to the beauty of our homes. Ride through the country where you will and you will see homes built as plainly as the architect could devise, not a vine to hide its bareness, not a tree to relieve its bleakness, no thought given within or without to the aesthetic side of our nature. Again you find homes that nestle among the hills as beautiful pictures surrounded by well-kept lawns, trees and shrubs. The vine covered porches tell of rest and contentment, the whole place showing that the comfort and enjoyment of his family was ever in the owner's mind. Doubt you for a moment that that home has a stronger hold on the boys and girls than the bare cheerless farm house, no matter how large the bank account? If we train our children to think money is the only measure of success, when the town offers more money, the farm has no charm for them.

Rather teach success as defined by another: "He has achieved success who has lived well, laughed often and loved much; who has gained the respect of intelligent men and the love of little children; who has filled his niche and accomplished his task; who has left the world better than he found it, whether by an improved flower, a perfect poem or a rescued soul; who has never lacked appreciation of earth's beauty or failed to express it, who has always looked for the best in others and given the best he had; whose life was an inspiration, whose memory a benediction."

I have in mind a certain locality in my own county noted for its beautiful homes and well stocked farms. There is no special market to account for their success, but the owners put their profits back into their homes and farms. The houses are heated with furnaces, supplied with water, bath rooms and modern conveniences, and in nearly every instance a son has staid on the farm. What did the town offer that they did not have, and how much of independence, health and contentment the farm offered the town could never give. Then shall we advise our boys and girls to leave the farm? No, for their chances of an upright useful life seems to me far greater there than in the crowded towns, where success is often achieved by the sacrifice of conscience. Now if we have made the farm so attractive to our children that we can have some one to help bear the burdens as life reaches its meridian, then it seems to me we are ready to enjoy the fruits of our labor and we will have no wish to leave the farm, for the habits of an active energetic life are fixed and to become an idler and oftentimes a bore to business men, holds no temptation to us, and is usually disastrous to health. Where there is no child on which to depend, the scarcity of help on the farm and in the house make the management of the farm a serious matter. What is the solution of this problem? Can we draw help from the shops? Shall we try the 'heathen Chinee with his ways that are dark and his tricks which are vain? Many claim that they make the best of farm laborers. If so, speed the time when the immigration laws are so changed to give us this much needed help.

Perhaps the lesson we must learn is less acres and more fertility. Meet the dilemma of farm help in the field and in the home and I say the time has not yet come to leave the farm.

Now comes the sunset of life with its failing strength. To leave the farm now means to leave the associations of a lifetime. Every tree and rock has become old friends. Every tree reminds him of the planting when his wife stood by his side, not a gray haired woman, but a sweet girlish form. The home has grown and become beautiful by their combined efforts; to leave it means to leave their personality behind them. The crowds of the city are pandemonium. The ways are strange and their days are saddened and shortened by the longing for the old home with its fertile fields and running brooks. Where the peepers were the orchestra that lulled them to sleep and the birds gave the signal that the morn had come. Shall we leave the farm in old age? No, I say again. Let us go back to our homes and make them delightful as possible. Let us educate some of our boys at least in our agricultural colleges. Let us teach our girls that to be a true wife and intelligent mother is the crown of womanhood. Let us put so much of our enthusiasm and enterprise into our business that we will never need to ask: When shall we leave the farm?

On motion duly seconded, the report was adopted.

The CHAIRMAN: Questions are now in order; Dr. Funk's paper was the first on the program.

MR. HERR: Mr. Chairman, would it be in order to offer a resolution at this time?

The CHAIRMAN: I see nothing to prevent.

MR. HERR: Mr. Chairman, I offer the following resolution:

"Resolved, That the State Board of Agriculture hereby endorses the bill (H. R. No. 345) introduced into the House of Representatives by the Hon. H. C. Adams, of Wisconsin, to increase the National appropriation to the Agricultural Experiment Stations, and requests the Representatives of Pennsylvania in the Senate and House to use their best efforts to secure its passage.

"Resolved, That the Secretary be instructed to send a copy of these resolutions to the Hon. H. C. Adams, to the Hon. James Wilson, Secretary of Agriculture, and to each Senator and Representative from Pennsylvania."

I move the adoption of the resolution as read.

The motion was duly seconded and agreed to.

The CHAIRMAN: Now if there are any questions on the report of Dr. Funk, we would be glad to hear them.

A Member: I would be glad to ask Dr. Funk if the lime, sulphur and salt remedy is adapted to all scale insects.

DR. FUNK: Yes, it will answer equally well on the oyster shell, scurfy scale and every scale I have tried it on.

DEPUTY SECRETARY MARTIN: I notice in your paper you spoke of the boiling of lime, sulphur and salt, and its coming to a proper condition, will you please explain that a little more fully?

DR. FUNK: There is a considerable misunderstanding on the part of the majority of the people as to the cooking of that lime, sulphur and salt. You find in all the papers and in all the bulletins, or almost all of them, a certain given time stated to cook it; some state three-quarters of an hour, and some an hour, but as to that, you can have no set time, at least that is my experience. You may have the combination you want in thirty minutes' time, and it may take you three hours. Years ago it was cooked for eight hours in the name of the old Oregon mixture; this is nothing new at all, this lime, sulphur and salt. The description given then was—they were told you to cook it until it becomes an amber color. That is very unsatisfactory. You will find that you may cook it as some may tell you for an hour, and you leave it stand, and you will find that you have a copper colored liquor coming to the top, yet if you look you will find that it will never become dissolved properly. You mix that up, and it is a very unsatisfactory preparation and not effectual for the purpose, but to have it do its best, you must cook it regardless of time, until it passes through all the changes. First, it starts with the lime, and when you get the sulphur in, it will become yellow, and you cook it until it will gradually turn an orange, and then it will come to a tomato color, like dark tomato catsup, and then it will turn to about a leaf green; it is then ready to be applied. I have never seen a single instance when it was in that color and condition that it did not entirely destroy the scale, if properly applied.

MR. HERR: What is your proportion?

DR. FUNK: Forty-four pounds of lime, thirty-five pounds of sulphur and fifteen of salt to the hundred gallons. I think we will have to leave the salt out in the treatment of the peach; the peach is very susceptible. I just had a gentleman come to me this morning who told me that he was recommended to apply the lime, sulphur and salt, and he used it in the proportion of 22, 10 and 50 and he said it not only destroyed the buds, but on all the young trees that were planted last, it destroyed the terminals back anywhere from six inches to a foot. In the trees that have been growing for about two years, it has not injured the terminals but has destroyed the buds in nearly all of these.

I have found that where I sprayed in the beginning—I have found that some of the terminals there, are injured by the lime, sulphur and salt so that I would advise leaving the salt out in peaches. I believe it preferable to leave the trees without spraying until the buds begin to expand.

The SECRETARY: I would like to know whether your apparatus is portable.

DR. FUNK: No, most of my fixtures, except the spraying outfit itself, are stationary. You see I have a fifteen-horsepower boiler which is stationary, and different series of platforms. Here is the driveway, for instance (indicating), and here is the first platform; that would be seven and a half feet high; there is a wide platform on which the mixing tanks are placed; that is three feet and a half above, and here is a longer platform (indicating) where the cooking tanks are; back of that is the boiler which creates the steam by means of which it is cooked, through the distribution of steam through pipes. Then it is run into the mixing tank and there diluted; everything is done by gravity; it is diluted to the consistency we want, from there it is run by gravity again through pipes into the tank on the wagon; that is closed, and then we use the carbon-dioxide—doing away with all pumping, no pumps used at all.

The SECRETARY: Have you ever seen an apparatus that is portable or could be made portable that would answer the purpose just as well? You have my thought. I want to know of something that we can get around with to show the people how it can be done successfully.

DR. FUNK: Certainly it can be; this spraying apparatus can be put on two wheels, a fifty gallon size that can be pulled anywhere with one horse, or put on a two-horse wagon, and you can have it placed so that you can put the kettles upon it in such a way as to make it practicable.

There is another matter of importance that I want to mention. I believe that the majority of people understand or are instructed to slack their lime and strain it before it is put in to boil; that is certainly wrong. I speak of it for this reason, when you put that in to boil, you will get only a little over 212 degrees Fahrenheit. Now you will understand that you must get—when you put the lime in, you get an increase of heat that will run over three hundred degrees, which you will never get if you first slack your lime and then

put it in to cook. There are a great many minor details about this thing that if omitted in putting it into practice, will seriously interfere with your success.

MR. FENSTEMAKER: I think that the Doctor forgot to mention stirring.

DR. FUNK: Yes, but you will need very little stirring if it is in a kettle like I have. If you have it cooked in an ordinary kettle of course you would have to keep stirring. As soon as the lime is put into boiling water, you will have to have that stirred or else it will burn and stick fast, even though there is water above; you have got to stir that loose until it gets into a regular boil, then continue boiling until you have got the combination you want.

When we cooked at our demonstration, we had one cooking that only took about thirty-five or forty minutes and another in about forty minutes, and I am satisfied that you could have held all the sediment or refuse that was produced, right in your hand. You will find that you have very little if you have good material and cook it as it should be. We put a cover over it to keep the heat in, and then we run it under about a sixty pound pressure. Some will tell you that they can cook just as well with a five pound pressure but I have never been able to do it; I find that under a fifty or sixty pound pressure, I can do it a great deal quicker.

I would rather use the lime, sulphur and salt, or else as a substitute for the salt I would use blue vitriol; take the old Oregon formula. Wherever I have used that I have had splendid satisfaction. I believe you can use that as a substitute for the peach.

A Member: In what proportion?

DR. FUNK: For a hundred gallons I would use about six or eight pounds of sulphate of copper, but that would have to be in a very dilute form or else it will not mix.

A Member: Is that more expensive than the salt?

DR. FUNK: At this time that will cost you about six cents a pound, so that it would only cost you from about ninety cents to a dollar. We find that the sulphate of copper prevents it from washing off better than the salt does; that will form an insoluble compound. You know in the Bordeaux mixture it forms an insoluble compound, and it is much more difficult to wash off.

MR. RODGERS: Last summer where I was at when they put the lime, sulphur and salt together, it turned black instead of the color that you describe. Mr. Foster, who was sent out by the Department, said he had never before seen anything like that.

DR. FUNK: There is one thing I think should be attended to by the Department, and that is, to have the lime of different parts of the State analyzed so that we may know what a good lime is. We find that the majority of our limes are strongly impregnated with magnesia, and it takes considerably more than it would if we had a true calcium of lime.

A Member: You put the sulphur directly into the mixture?

DR. FUNK: Yes, we have three kinds of sulphur. We have a sublimated sulphur that runs 150 pounds to the barrel. We have a fine flour of sulphur—you see this other is called flowers of sulphur—then we have the fine flour of sulphur that runs 225 to 250 to the barrel. The sublimated is the best; it will make a combination a great deal quicker. The other is a rose sulphur.

A Member: You use the same in quantity?

DR. FUNK: Yes.

A Member: Does the oyster shell scale breed on any other trees than just fruit trees?

DR. FUNK: Yes, it breeds on the ash more than any other tree. I find them on a great many trees. People are often mistaken in what they think is the San José Scale. ;

The CHAIRMAN: Mr. Knuppenburg's paper is the next in order. Are there any questions on that subject or on any of the other papers or any discussion on them? We would like to hear from any of you on this question.

The SECRETARY: Mr. Hutchison would have some ideas on the horses of the State. I think it would be a pretty good idea for him to come to the front now.

MR. HUTCHISON: Mr. Chairman, I have thought that measures might be taken for the improvement of the live stock of our State the same as they are doing in foreign countries. There they are purchasing stallions and placing them out in different sections for breeding purposes. This is being done by the Government—I think it is Belgium, is it not, Mr. Secretary?

The SECRETARY: Yes, Belgium.

MR. HUTCHISON: These horses are kept a certain number of years in a certain section, and then transferred to another. Now why could not this be done by the great State of Pennsylvania? Why could not the State invest several hundred thousand dollars in this industry? Have these horses purchased through the proper channel and place them in care of the County Commissioners of the State and in this way we would improve the live stock of our State.

To-day we are drawing on the Western states for horses that are not the very best. They are horses that grow up without development, except in flesh and bone, and when they are brought into this State for use, a large number because of colds and other diseases, die.

If we had some system of this kind to improve our stock, it would be a great boon to the people of our State. We are getting means for our colleges and schools and for other departments, and why not have this taken up by the farmers of Pennsylvania and have some of this great surplus used to improve the live stock of our State? This may be a crude idea, but if it is practicable in other countries, why not adopt it in our country? I remember the time, not so many years ago, when the county of Indiana was one of the best counties in the State in the colts got there; they were brought over into Huntingdon county and some of the finest horses raised, and our

fathers sold them at good round prices. Now that industry has all gone out of the country.

I would like to hear now from some of our friends, whether they think this is practical or not. Our good Governor, who is so much interested in farming, and all industries of this kind, perhaps might take the matter up if he could be convinced of its importance, and he might be inclined to amend his proclamation so as to cover this subject, as one of the specific matters of legislation to be acted upon at this special session.

MR. CHUBBUCK: Mr. Chairman, I just want to second Mr. Hutchison on that, and I believe it is perfectly feasible. We have now in my own county one of the Belgium draught horses, a very fine animal weighing some sixteen or eighteen hundred; one of the handsomest animals I ever saw. An organization of farmers bought this horse as an experiment, and I think they are going to make it pay.

The CHAIRMAN: We have the pleasure of having Judge Beaver with us at this time, and I know that you would all be glad to hear from him.

ADDRESS OF GEN. JAMES A. BEAVER.

Mr. Chairman and Gentlemen: I have no theories on this subject, but I have a little practice. I believe rather in the man who practices than in the man who preaches. I went into the French coach-horse business once myself with nineteen of my neighbors. We paid \$2,100 to the gentleman who brought a single French coach-horse into the county. We got five per cent. off for cash. My share cost me \$95, and I am satisfied that \$1,500 if not \$1,600 went to the man who sold it to us. We stood him, and I think I had two colts out of him. We were to have a colt a year. I got two colts; we kept him at our farm without any charge, and in about three years they began to call on us for a contribution for his keep during the winter, and about two years later he died. I am afraid your experience might be similar. Now that horse had a good groom, was carefully cared for, was looked after every place he went by some one that was interested in it, and if you turn my friend Hutchison's horses over to the County Commissioners, I think they would die inside of a year, and the State of Pennsylvania would get about ten cents' worth of horse-flesh for all that she paid, and not a cent more, because we had practical horsemen looking after our purchase, and I am satisfied that we didn't get more than about ten cents' worth of horse-flesh as the result of our investment.

I do not believe there is any industry in the world that pays such a percentage as the man pays who indulges in it—in the purchase of fine breeding stallions, as they are called, that are brought into this country and sold at high prices and they are never worth what you pay for them, and unless you could get the State to engage in the purchase of horses where they are bred, and get into relations in some way or other, with the countries that breed them, I do not think it would be a success. If we go into the open market to buy in France or Normandy, or Belgium, where our French coaches and Belgian horses are bred, I do not think we could make a success

of it. If we could get into relations with our Government, and get France to loan us or sell us some of their own horses, there might be something in it, but to have the horses pass through the hands of a sales agent in Belgium or Normandy and then through the hands of another agent here, you know what that means. There is, of course, force in the idea of the Government looking after breeding, not only for horses, but for cattle and for sheep.

I called day before yesterday with the Assistant Secretary of Agriculture, at State College, and we looked down from the dome of it over our great Nittany Valley and became enthusiastic over it, and I said, I do not see why you cannot organize a project here in your Nittany Valley that would give us a distinctive breed in this community, and would do more for the dairy interests of Pennsylvania by getting the Government, which the Government would do, to put a certain number of bulls into this valley, so that you might breed for milk and for beef, and at the same time you would do more for the dairy interests of Pennsylvania than in any other way.

I think that the demonstration that has been made in the breeding of plants, has done more for the instruction of the farming interests of this country than any other sort of education that we have had. Now this thing of breeding plants and improvement by breeding, is comparatively a new thing for us, but it has an educating influence that extends not only to plants but to animals.

I confess that it was rather new to me that the Government would lend its aid to the development of new breeds of cattle, just as it lends its aid to the breeding of new plants, and improving the varieties of plants which we are growing on our farms. I do not know whether you have had any papers on this breeding of plants, but if you have followed the thoughts involved in it, and the progress that has been made, you have found what Iowa has done in the matter of her corn raising by calling into its service the railroads. Take the great railroad of "Jim" Hill and see what it has done. He has not only given us a railroad, but has invested money in live stock and in plant culture, and has sent out men who have inculcated plant breeding, sent them out broadcast over the country.

I think that if some such plan as that was adopted in Pennsylvania, illustrating the breeding of corn, if the railroads would take hold of it and send it over their lines, the Pennsylvania and the Lehigh Valley and the Reading; if they would combine, they could reach nearly every part of Pennsylvania, and following the course pursued in Iowa by the railroads there, they would add twenty-five per cent. in five years to the value of our corn crop, because we would grow more and better corn, and grow more of it to the acre, and as a result it would bring more profit, instead of a barely living profit on the best corn that we can raise.

That is what they have done in Iowa, and the thought there grew in the mind of an old Pennsylvania Dutchman, who moved out there twenty-two years ago and bought 28,000 acres of land, and they have got it in that family yet, and the boys who have been educated in Harvard and Yale, have come back to follow their father's occupation. They had ideas as well as crops and one of those boys has taken up this great question and from his study of it has grown the great plan which has been adopted by their railroads and by their agricultural college for reaching and teaching the farmers all

over the State by means of a car that runs specially for the purpose, a car that goes to each one of the agricultural sections for the purpose of instructing the farmers of the State by adopting this plan of breeding for improving corn and for the increase of corn production.

Now this question of breeding, of course, has taken me off of the subject, but there is more in Hutchison's idea, perhaps, than we at first think. If the Government can import bulls and transfer them from one part of our country to another part of the country, if they can import cattle, it is just as practicable to do it in the matter of horse breeding, and if the United States Government would get into relations with the French Government and Belgian Government, so as to get from the Government breeding stations the best kind of horses from those governments, I cannot see why if the Government were to establish a stand in any one of our counties and put a competent man in charge of a stallion, why we might not reap the results of it just as we are reaping the results of breeding plants under the auspices of the Agricultural Department at Washington.

The Government is doing more for the South in that direction than for the North, because the South has had no variety in their agriculture, and they are establishing farms all over the South in order to teach the people that they can diversify their agriculture, that they can feed their own stock and own animals as well as raise cotton and "hog and hominy" and at the same time improve their lands.

There is one man at Washington who is giving his whole time to running these farms in the different parts of the South in order to demonstrate that if that can be done in one direction, there is no reason why it cannot be done in another.

In speaking of turning this over to the Commissioners and having a special place provided for keeping them well, it seems to me there is no reason why we could not improve our horses ourselves as well as improve our cattle. I tell you, gentlemen, that we have not yet started on the development of our agriculture in Pennsylvania; we have scarcely made a beginning and it is just now that we are waking up to the tremendous consequences, to the tremendous influences, to the tremendous results that follow from a study of agriculture, and the practice of the best agriculture that there is in the country.

My friend who has read about the time that we shall leave the farm, wants to go a step farther. He wants to make it not only the most independent occupation in the world, but the most absorbing occupation in the world. There is not any occupation that has so much science at the bottom of it and so much in the way of practical results at the top of it as the avocation of scientific agriculture, the ordinary everyday growing of our crops and our animals. It is just such talk as this and just such talk as Hutchison has put out, that will enable us to reach practical results, that will make Pennsylvania what she is and ought to be, the leading State in agriculture in all its varieties of production.

Why, the dairy products of the United States are third in value, possibly second to corn, and even the industry of hens is fifth in the value of the products in the United States. If you look at the population of Pennsylvania and the distribution of the population, you

will find that we have more small cities of 20,000 and over, than any other State, and what does that mean? That means that the dairy-men and the poultrymen are wanted in every one of those centers of population, that there the door of opportunity is wide open for the right man to enter in.

Now what does all this mean? It means that we must bring our best thought to our dairy and poultry departments of agriculture because these centers of population are ready to absorb the best that we have and the most that we can raise. I suppose that most of you have had my experience. When Mrs. Beaver and I were over in New York, about Thanksgiving time, the old lady that furnishes our turkeys says, "You usually get your turkeys from me, and I want to tell you that I had a man here to-day that offered me twenty-two cents a pound." Now we used to buy them at ten cents a pound. Mrs. Beaver, being afraid that she might not get any turkeys, immediately said to the old lady, "Why, certainly." Before Christmas came they were down to fifteen cents, and the old lady got her twenty-two, and she had it honestly because the hucksters had offered her that.

I want to tell you that all these questions of breeding clear through to the poultry yard, and of getting the best results from them all, are they not worthy of discussion, and worthy of thought and worthy of theory in every direction, therefore it seems to me that we will do well if we begin at the very foundation of breeding. We know what it means in the horse, we know what it means in cattle, we know what it means in poultry, and we know what it means in plants, therefore, the great importance of getting at the bottom of the thought involved in breeding for all products of the farm.

I hadn't thought of saying anything and would not have said anything if friend Hutchison had not called on me, but it is a great pleasure to get a new thought and try to analyze it and revolve it in your mind, especially when you can see that it may lead to important practical results.

Prof. Hamilton was called upon by the Chairman, and upon request, came forward, speaking as follows:

ADDRESS OF PROF. JOHN HAMILTON.

When Mr. Fenstermaker was making his speech, he referred to an organization in the State that he said was deemed on all hands to be ornamental, and he hoped it would be useful. I suppose he referred to the new constabulary force that has been recently organized in the State of Pennsylvania. In thinking over the suggestion and applying it to the State Board, I feel this, that the State Board is deemed on all hands to be useful, and I have been sitting here looking at the backs of your heads, which are decidedly ornamental. Now the line of usefulness of this Board I think has been limited, heretofore, way behind that of its possibilities. The Board comes up as the representative of the agricultural societies of the State, and these agricultural societies represent the progressive young men of Pennsylvania. Much of their work has been in the wrong direction. That is admitted I think on all hands, and all that they need is that their energies shall be directed in the right channels in order to have more wonderful results, and it seems to me we ought to utilize these young men who are engaged in agricultural exhibitions

throughout the State; we should utilize these organizations that give life and being to this State Board of Agriculture.

Those of you who read the last recommendations I made to the Governor, as Secretary of Agriculture of this State, will perhaps recall that I referred to this matter that has been brought up in a somewhat different—brought to our attention, in a somewhat different way by Mr. Hutchison. I asked the Legislature to make an appropriation of \$25,000 to the Secretary of Agriculture for the purpose of improving our county agricultural organizations. The plan that was proposed was practicable; that was to offer a premium to such agricultural societies in the State as would put out exhibits of valuable articles that were really worthy of the attention of agricultural people, and to do this other thing, to offer a premium to agricultural societies in the State that would organize and equip a stock barn and put in some animals that would be selected by veterinarians appointed by the State, approved by the State, and have these for service in every county in Pennsylvania, guaranteeing these associations that if they had good animals thus approved and have them so that they would be accessible to the membership of the organization first, and then afterwards to those of their citizens through the county, that the State would give a bonus of anywhere from three hundred or five hundred or eight hundred dollars to that society to encourage them in the manner of breeding animals that would be of value in the improvement of the live stock of our State, and this would extend to cattle, horses, sheep and poultry so that the agricultural societies would be live organizations for 365 days in the year, and of service to the people, and that we could revolutionize the stock industry in twenty-five years, yea, in ten years. Twenty-five thousand dollars is not enough; but suppose we had a stock barn under the supervision of an agricultural organization in every county in Pennsylvania. I believe that that is the chief and the most effective way of bringing about a change in our stock industry, and a practical feature, one that can be put in operation immediately, and I am satisfied one that would be accepted by nine-tenths of the agricultural societies of our State. I believe, as I did then, that the State could appropriate money to no better purpose for the department of animal industry of our Commonwealth, than to put it into the hands of these young men who are running our agricultural organizations in the several states, have it given to them through the Secretary of Agriculture, so that they would not be paid anything at all unless the animals that they had for service were approved by proper authorities. I believe that we can neither improve our stock in this State nor in any other state until we do just what foreign governments have done. In Hungary there are the largest stock barns in the world. I believe I speak within bounds when I say that their animals, horses, cattle, sheep, swine and poultry are under government control in that country. The military, the standing army, have charge of these stock farms and the soldiers are sent out in the spring of the year with the government stallions to various parts of the country, and these animals are there under government supervision, and in the custody of the soldiery of the country in these several districts. In that way the Hungarian Government has bred the best horses that can be found perhaps anywhere on the Continent of Europe.

Perhaps we cannot do so much as that, but we can approach that. I believe that we ought to help people to help themselves, and so by giving this help great good will be accomplished, and we shall be doing all that the State ought to do, and the State, by giving this expert advice in order that these animals will be properly selected, will be doing along that line all that the State ought to do.

I believe that this Board has only begun its field of usefulness. I congratulate the Board that it has an appropriation of its own, and people will look to see the work of the Board and will be surprised at what shall be accomplished until the State Board of Pennsylvania shall be quoted all over the United States for the progress that has been made in the aid of agriculture in this great Commonwealth. No people, no Commonwealth, has the opportunity that this State Board of Agriculture has, right here in Pennsylvania, and you can get all the money and all the aid you need if you only will ask for it. The Legislature is ready to help you if you show yourselves to be useful. I know the men who belong to this Board and I know they are in earnest, and I know that if suggestions are made, they will properly spend any funds that the State may give into their keeping. I believe we ought to utilize these organizations that we have, keep them from being mere fake concerns, but turn them into beneficial organizations, so that they will be appreciated as being highly useful to the State instead of being referred to with a sneer.

Are you ready for that great work? Some of you are getting old, some may be getting a little tired. If you are, my advice is to get out and let some young man come in. Let us have progress. Do not let us stand still, but let us go on from one advancement to another.

Thirty years since, you and I, Mr. Edge, met here to organize the State Board of Agriculture. I believe we are the only two living members who were present at the birthday of this organization. The next thirty years ought to make great changes in Pennsylvania, as it should in the theories of this Board.

Another thing I want to say right here while I am on my feet. We have got to come to this; there cannot be anything done any more except through education. You want to stand by your State College. I tell you in every state that is the rallying point of agriculture, and the more I go over our great country, Iowa, Wisconsin, Michigan, Minnesota, Illinois, the more I realize this fact, that we must look to the State College for our inspiration and instruction. I have just come from Nebraska, only a week or so ago, where there were five hundred school children, who came from all over the state and came up to their State Capital and met there where there was a great corn exhibit, and articles made from corn, cooked by school children fit for the finest epicure in New York city: I tell you they are awake out there. Now, what can we do in Pennsylvania to wake up our agricultural people here? If we take this matter in hand with our great State treasury full of money waiting to be properly expended, what may we not accomplish? We have all the advantages that any set of men could ask for.

Dr. Schaeffer was called and spoke as follows:

DR. SCHAEFFER: Mr. Chairman, the only thing that the people of Pennsylvania have allowed me to think about in the last three months is vaccination, and when farmer Hutchison brings over those stallions from foreign countries, the first thing we will do will be to have them vaccinated. I hope we will have a law passed so that we will be obliged to vaccinate our trees against San José Scale, and then go one step further, and when the soil becomes unproductive, I would like to have the farmers send down to Washington and get some of that stuff by which they vaccinate the soil, so as to make that more productive. I presume that if all these reforms are carried into effect, that these farmers who farm the farms will begin to farm their own farms, and there will be a scratching on the farms, far more vigorous than the scratching of those hens in the Buckeye state.

Prof. Shaw, of Minnesota, was called upon and spoke as follows:

ADDRESS OF PROF. THOMAS SHAW.

Mr. Chairman and Gentlemen of the State Board of Agriculture: I must say, gentlemen, that I listened with a good deal of interest, particularly to the report that was made on the live stock industry, and I fancy I do not require to tell you as a piece of information, that that is beyond all comparison, the most important agricultural industry in the United States. I take it for granted that you know that the relations between the prosperity of the live stock industry in the State and the value of the land, and the profits that are made from the land, are of the very closest kind. I take it for granted that you know—I simply speak of it by way of reminder—that the State that leads in the United States in the production of live stock, is the State of Iowa, is the same State that leads in the profits that are obtained from the land per acre, and as it is everywhere in the different states of the Union, that the relation between the value of the live stock kept in the state and the profit made by the people of that state from agriculture—that the relation between them is simply inseparable. I take it for granted that you have noticed that in communities where live stock flourishes most, that there the land is still best, that there the fertility of the land is best maintained. I take it for granted, Mr. Chairman, that you know that the relation between the value of the land and the amount of the live stock kept on the land, is of the closest character, so close that the two are practically inseparable. In the southern part of the State of Minnesota farm lands have sold for \$100 per acre, while in the Red River Valley, where the land is equally good, where they have good lands but where wheat growing only has been carried on and the growing of live stock has been neglected, there you will find that land sells for only \$20 to \$30 per acre, and the only solution of that which I can give which explains the difference in the value of the land in the Red River Valley and the southern part of the State of Minnesota to which I have referred, is that in the one case they grow grain, and in the other case the farms are well stocked. I take it for granted that the State of Pennsylvania gives its attention to that matter which it is important to observe.

I was surprised at the report given in regard to the sheep industry. Why, it seems to me, gentlemen, that from what I saw yesterday, that I never passed over a state that was better adapted to the growing of sheep than on these hills of this same State of Pennsylvania; and I must say, sir, that I was somewhat pained to know that there are fewer sheep in the State of Pennsylvania now than there had been some time previously. I was surprised to know that the dogs in the State of Pennsylvania had more power than the farmers or the Legislature of Pennsylvania. I acknowledge that while I am an American, and intensely so, that I have not been long in these United States to get right down to the bottom of the politics of the country, so that I will not attempt to give an impression along that line, which might be erroneous.

I would like to make this suggestion, Mr. Chairman; I think if there is any one thing in the world that is more valuable to a man than any other thing, it is the way that he makes a proper use of time and opportunity. I do think that a man is untrue to himself and to the man he talks to, when he is given an opportunity to talk about a question when he does not try to make some suggestion of a practical character that can be put to a proper use, and before sitting down I would like to leave this thought with you. I would like to know why the winter lamb industry does not tower way up higher than any other industry in any other state in the Union in this State of Pennsylvania. I know that dogs may interfere with this industry to some extent, as the sheep industry is ordinarily carried on.

You know that a winter lamb is grown in the winter. It is fed rapidly. It is pushed along until it reaches the age of about two months or two months and a half, and attains the weight of about thirty to forty-five pounds, and then it is sent to market, and commands a high price. Now, it seems to me that the markets that you have in this State—you have markets everywhere—markets right at the door, and it seems to me markets among the very best that can be found anywhere, and it seems to me that the demand for that kind of a product would be almost unlimited.

I worked out that problem myself in the State of Minnesota. What I wanted to do was to find out how the farmers could begin cheaply and get that habit established with common ewes. I worked out the problem and it worked out very satisfactorily. We began with ewes that could be bought for three or four dollars apiece. We saved the progeny and improved it, and we had not to go three generations until we found that the proper habit of dropping the lambs in the fall had been, as it were, completely established, and the only other considerable expense was the outlay that was involved in the purchase of the necessary rams. I do not know what those lambs would sell for in the State of Pennsylvania, but I know that that kind of lambs has been reared in Minnesota and sent to New York and sold for ten dollars apiece. You may say why didn't the people of Minneapolis pay ten dollars rather than send them to New York? It was simply for this reason. The people of Minneapolis had not got schooled to their use. I did succeed in selling them in St. Paul and Minneapolis for seven dollars apiece; we never got quite to the ten dollar mark. We got that for lambs that weighed forty or forty-five pounds apiece. Now, when a man can get that amount of money for a lamb so readily raised and at so comparatively small ex-

pense, and the profit so quickly realized, he is engaged in a business that is going to keep him on the farm.

Mr. Cook, of New York, was called for, and came forward and spoke as follows:

ADDRESS OF H. E. COOK.

Mr. Chairman and Members of the State Board of Agriculture: I am sure it would be impossible for me to follow the eloquent gentlemen who have preceded me without feeling somewhat embarrassed, and my reputation will be better sustained by keeping quiet. I have to speak to you people to-morrow, not only once but twice, and at this late hour it seems to me it would hardly be in keeping to take your time.

I have been deeply interested in what you have been saying; I like to hear men talk about their great possibilities, because I suppose not one of us will ever live up to his possibilities. I do not think much of a man that does live up to his ideals. When you get to that point, it is about time to drop off and pass into the other world. I like to have the ideal just a little ahead. I believe you are the second greatest state in the Union, sir. I believe in standing by your own State first, last and all the time, if you do have to lie a little to do it. I believe in your standing by your opportunities, great as they are. I believe that the time is ripe for eastern investment. I believe, farmers, that the time has gone by when men should seek western investments in lands. We hear a great deal about the psychological moment. It seems to me to-day, as far as eastern lands are concerned, it is a farmological moment, if I may be permitted to use that word, and that the time is ripe for the East to do something. I have seen something of Eastern agriculture and something of Western agriculture. I have been over a large portion of the East this past year, and assure you that men, not alone in the State of Pennsylvania, are bestirring themselves and are waking up to their opportunities. Why, in the old State of Maine, even in that old state, the farmers think that is the best place that God ever permitted his sun to shine upon. Wherever you go there, you will find that the people think that it is the only state in the Union, and you will find that they have bred there a true type of Americanism and you will think after all there are good people in Maine, and those people are stirring up things in the line of their best interests while the western man takes very little stock in what we can do. He usually tells us, "O yes, New York, Pennsylvania and New England are mighty good places to be born in," and then drops the whole proposition right there. We are now coming to the point where we are going to show these people what we can do.

I saw some farms last week, going over the old State road of New York, that in my judgment afford a better place to put money than even the great State of Iowa.

I was glad to hear another suggestion here as to the necessity of rallying around the agricultural college closer than you ever did before. I spent yesterday with a gentleman near Owego, in our State, a man doing splendid work on his farm taking those old hills and utilizing them, getting five cents a quart for his milk. What do you suppose he says? He says, Cornell University is responsible for this whole thing. He says it is responsible for this work that

I am doing here, and he is a modest fellow, too. He says Cornell University is responsible for this and more. That man is fit to teach, and yet he told me that his business would be so ordered and adjusted that he should go, to Cornell University, each winter and spend a little time there checking himself up to date. When you come in contact with such men and realize their influence, you better appreciate the work of the agricultural college. I tell you it means much. I do not know just how much support you are giving to your schools here, but I tell you farmers that the agriculture of the future, yea, and of the minute, must rally around its agricultural college. Let us stand by that. I have seen too many men who have not appreciated what is being done for the interests of agriculture, but I trust the time is now here when there may be a better understanding, and when our farmers will be convinced that that is what they want to do.

The CHAIRMAN: I have been very highly interested in what has been said, but as we have here very high legal talent with us this evening, I would like to hear something on this road question and the road laws.

MR. McCracken: Mr. Chairman, I was going to say that we all have our hobbies, as they have been suggested to me, by listening to the several papers that have been read and the suggestions that have been offered; but to my mind, the one thing that has made the deepest impression upon my "thinking pot" was brought out by the discussion of the road question. As the Chairman has just suggested, if there ever was a people on God's earth anywhere that for generation after generation was cursed with a curse that knew no blessing, it was the people of Pennsylvania under the road system we have lived under. It has been already suggested that after our forefathers and ourselves have been living under this curse for so long, the time has finally come when it seems as though we were about to launch upon a new era.

I believe, Mr. Chairman, that now for the first time in the history of Pennsylvania, we have the beginning of a system that is going to make the Commonwealth a system of roads of which we may well feel proud; but let us remember this fact, that in the building of public roads, as in the building of anything else, there are certain fundamental principles that we must get down to, and which, if we adhere strictly to, we will be led to success, but if we deviate from them, we will be led to ruin. It is just the same in road building as in anything else.

Now what are some of these fundamental principles that first suggest themselves? Before we can realize what the benefit of the new law will be, we must fully realize what the details of that law are. Now what has been the trouble with our old road system? It is this. It was built—the roads were required to be built altogether by the class of people who ought not to have built them at all. The burden of building roads has been placed altogether on the farmers of Pennsylvania, the men who use them the least, but I am glad that under our new system on which we are entering, that another principle is being recognized; that under our present law, that the State stands ready, out of this big treasury that we have been talking

about, to contribute at least fifteen per cent. toward the building of our roads. Now that is a step, my friends, in the right direction. It is a step that is going in a very few years to enable the people of the State of Pennsylvania to enjoy a system of good public highways, and when that fifteen per cent. of the system has been in operation a year or two in Pennsylvania, the people of Pennsylvania will realize that it ought to be forty per cent., and they will so make it, and in that way, when the public roads come to be built and maintained by the public who use them, then we will have a public road system that will be a credit to Pennsylvania. You show me a community where they have finely rounded up, good public roads, and I will show you a community where they have lovely homes, happy homes and a prosperous people, but you show me a community where the water runs down the center of the road, besides, grown up with bushes, and I will show you a community where the people do not amount to the snap of your finger.

The CHAIRMAN: I would like very much to hear from some of the gentlemen who could give us in a very few words just what our road law is that we are trying to get in practice.

MR. HUTCHISON: Mr. Chairman, we have here the chief clerk of the Highway Department, Mr. Roy D. Beman, and I have no doubt but that he would give us that explanation; will you come forward and say a word, Brother Beman?

The CHAIRMAN: We would be very glad to have the chief clerk of the Highway Department come forward and give us in a few words the substance of what the new law is.

MR. BEMAN: Mr. Chairman, I was deputized by Mr. Hunter, absence on his part being unavoidable, to come here for the purpose of giving you a very few figures and answering any questions that might be asked relative to our work. The two things, agriculture and good roads, go so closely together that it seems fitting that our Department should be represented.

I want to refer, in the first place, to Mr. Fenstermaker's very able report and to one of his remarks in which he said that it was stated or claimed by the Department, that there was less opposition to the State aid measure, or the Sproul and Roberts law, as it is known, than at first. That is true, and more than true, and that it has decreased to a great extent, I think can probably be best proved by the presentation of some figures. We have received up to, and including to-day, 574 applications asking for State aid in building roads. Those applications cover 1,101 miles of road. They come from 61 of the 66 counties of the State with which we have anything to do; as you can readily see, these applications, coming as they do from 61 counties, it is a mere matter of mathematics to ascertain that 92 per cent. of the entire State is represented among these applications. The applications come from 328 townships out of 1,548 in the State, or in other words, about 21 per cent. of the townships have applied for State aid, and 37 boroughs under the amended act, passed by the last session of the Legislature, have also applied for State aid, a provision of the law being that only sections of roads in boroughs which form parts of and go with adjoining sections of roads in a

township, can be rebuilt through State aid. Furthermore, in 37 counties out of the 66 in the State, we have now on file as many or more applications for roads as can be constructed by the State aid apportioned to those counties up to the first of May next. I think that these figures will answer conclusively the question whether or not the people are waking up on this subject.

I referred a moment ago to a provision of the law touching upon roads in boroughs, and I want to say that it is the policy of the Department, so far as it has any influence upon applications, to have applications, or as long stretches of road as possible, in order to get up a pretty continuous line of road. It is true, however, that in many localities, people who are not familiar with the road question, who do not know what a good road means, are not willing to go in it deeply enough to build more than the minimum length of road allowed by the law. In such cases, it seems to me that it is wise to build those little short pieces of road. The wisdom of that has been shown wherever a short piece of road has been built, because it has stimulated the people to build more.

I do not know that I can add anything further, excepting to correct a misapprehension which may exist in the minds of some, as to the laws most recently enacted respecting road taxes. The State aid measure, the one under which roads are rebuilt under the direction of the State Highway Department, is the Sproul-Roberts Road Law, originally passed in 1903, re-enacted, with some changes and amendments, in 1905. The new law which controls the election of supervisors is not the Sproul-Roberts law. I make this statement because the newspapers of the State quite widely heralded the fact that Judge Bouton, of McKean county had declared the Sproul-Roberts law to be unconstitutional.

I think, Mr. Chairman, that covers all I have to say, but I should be glad to answer any question asked me.

A Member: Mr. Chairman, I would like to ask a question in regard to this road law. It appears that a law has been recently passed that we are going to vote on this coming month; that is the one that the gentleman has referred to. Now we have a law that is known in the western part of the State as the Flinn Law and we have in our county and adjoining counties three road laws in operation. Now can we work under all three of those laws?

MR. BEMAN: As to that, I will say that I think there is no question but that you can work under all three of those laws, because, as a matter of fact, when they are properly looked at, they are complementary, the one to the other. State aid makes it possible for roads to be constructed at less expense to local taxpayers, the county paying one-eighth of the cost. Beyond a certain point, reconstruction by State aid cannot be carried out, because of the law's restrictions, therefore, when applications from a given county have been filed sufficient to consume the entire apportionment of any one year, a halt is reached in the construction of roads by State aid. If that county has funds at its hand, there is nothing to prevent it from going ahead with the work.

MR. TAYLOR: In Washington county they are putting up some of that road in Mt. Pleasant township. We have different pieces under the Flinn act going on at the same time. Now the point is this:

Mt. Pleasant township is paying a share of that under the Sproul act. Now if the county puts up a part of the road under the Flinn act, they must pay their proportionate share of that located in another part of the county, and then under this recent act which we are going to vote on, they put the money directly in their own road. Now the question is with our people, is it right that we should pay so much in road taxes in that way?

MR. BEMAN: That is not a question for the State Highway Department, but a question for the people of Pennsylvania.

MR. BLYHOLDER: There is one question I would like to ask, and that is, under the recent law that we are under now, supposing they can, in certain townships, get men to serve without compensation, what would be the action then? Or supposing a township should elect their men and they should refuse to serve, what recourse has that township then?

MR. BEMAN: I would say in reply, that that is a question that I have never been able to answer satisfactorily to myself.

MR. FENSTEMAKER: I think that the Court appoints in that case.

MR. BEMAN: It does not seem to me that there are many communities where there are no public spirited citizens who are willing to try for a year at least the experiment of this new law; there are a number of things, of course, that are not perfect, but it seems to me that at least a year's trial would be fair and proper.

As to the question of compensation, the Deputy Attorney General held that the Supervisors could not receive any compensation for the time spent by them in performing their duty, but that they could be reimbursed for their actual expenses.

A Member: What is the actual minimum amount of miles that a road master can take.

MR. BEMAN: The minimum amount is five miles.

A Member: What is the maximum?

MR. BEMAN: The entire county, if the supervisors see fit to do so, but it must not be less than five miles.

A Member: Why is it that the farmers are left in ignorance in regard to the road law?

MR. BEMAN: The State Highway Department issued several months ago a copy of both of these new laws and placed in the hands of every newspaper in the State, a full and careful abstract of all the new provisions of the law, with the request that each of these papers should publish it, or as much of it as they were willing to do. Further than that we are not able to do; we are not able to ship copies of the law to every person in the State, but we do send them to every person who asks for them.

A Member: I would like to inquire as to the Secretary of the Board of Supervisors; he has a good deal to do, and has to do that all for nothing.

MR. BEMAN: No, the Secretary of the Board has the right to receive compensation for the work that he does as Secretary.

A Member: How much can he charge for it?

MR. BEMAN: That is for the Board of Supervisors to provide. I might say one thing further in regard to the new law relating to supervisors. There seems to have been an intention on the part of the framers of that law, to place that feature on practically the same basis as that of school directors. The school directors serve without pay. The supervisors are not required to spend their own time and personal service in the affairs of the road; that is placed specifically in the hands of the road master. The supervisors are the managing board and they appoint the road master to carry into effect their wishes. The new law removes a very large proportion of the amount of time that has formerly been consumed by supervisors in discharging their duties.

The CHAIRMAN: I would like to ask one question for information. Take for instance a town that wishes to build a road in connection with the township road, and running through a street, would they be allowed to pave that street with brick?

MR. BEMAN: We have in a few cases used brick. There are occasionally pieces of road over which the traffic is excessive, and where the expense of repairs would, in a short time, amount to so much that it is deemed wise to substitute brick for macadam, at a greater first cost, but a later less cost of repairs.

The CHAIRMAN: Another question. Are these supervisors allowed mileage?

MR. BEMAN: The opinion of the Attorney General holds that they are entitled to be allowed for actual expenses paid out for transportation and meals, and in case of necessity, horse feed, railroad fare, if necessary. I think a supervisor could make no charge for his own horse.

The question has been asked me whether or not a township can vote upon the question of a cash tax or returning to a working tax. I will state that the Attorney General has held that they can change back to a working tax if desired.

The CHAIRMAN: That is a part of the law that the Judge of McKean county has declared unconstitutional.

MR. BEMAN: Yes, his opinion touches no other portion of the law.

On motion, duly seconded, the meeting adjourned to 7.30 o'clock this evening.

Wednesday, 7.30 P. M., January 24, 1906.

At the designated hour the meeting was called to order, with Mr. A. J. Kahler, in the Chair.

The CHAIRMAN: The first paper in order, under the head of Microscopists and Hygienists, is by Prof. C. B. Cochran, of West Chester.

Prof. Cochran was absent.

The CHAIRMAN: The next paper is by Dr. George G. Groff, of Lewisburg, Pa. Is Dr. Groff present?

The SECRETARY: Mr. Chairman, Dr. Groff will not be here. The report can be read, or filed, just as you please.

MR. HUTCHISON: Mr. Chairman, I move that it be received and published in the proceedings.

Motion being seconded, it was agreed to.

The report of Dr. Groff is as follows:

THE FARMER AND PUBLIC HEALTH.

BY DR. GEORGE G. GROFF, Microscopist and Hygienist.

The farmer, from his location along and at the head of public water supplies, and from his being the producer of the largest portion of the national food supply, exerts a considerable influence upon the public health. It may be of value to refer to some of the more important points of contact.

I. WATER SUPPLIES.

These should be contaminated as little as possible. Animal waste of all kinds is of too much value to be thrown into streams, and besides, no one has any moral right to pollute and impair, for human use, a natural resource, given for the good of all. Buildings should not be drained into streams, and especially no privy, cesspool or sink should be allowed to empty into a stream. Privies should not be erected over streams. Farm sewers should not discharge into streams. The most harmful of all waste is that from human bodies and this we should keep out of streams. Night-soil should not be thrown into streams, nor should it be placed on fields near streams into which it may be carried by rains.

II. FOOD SUPPLIES.

Fortunately, most disease germs seem, with ordinary exposure to air and light, to be short-lived. Yet, it is possible for some food products to be contaminated on the farm, and to reach consumers in time to reproduce the disease. This is especially true of milk, a material which serves as a breeding ground for the germs of a number of contagious diseases, as typhoid fever, diphtheria and scarlet fever, and possibly for other germs. So certain are the above statements, that no person suffering from any disease recognized as contagious in any degree, should work among cows or handle the pro-

ducts of the dairy in preparing them for market. This restriction may often work hardship, but it is the only right and proper course to pursue. But probably the greatest harm results from many diseases occurring in so mild a form that their real character is not at all discovered, or not until the milk has been contaminated. This may be true of typhoid fever, small-pox, consumption (tuberculosis), measles, diphtheria, scarlet fever and dysentery. When any of these diseases are suspected, the affected person should have nothing to do with milking, working in the stables, or in handling the dairy products.

A consumptive, by spitting in the stable, might be the means of contaminating the milk, the cows lying down in the sputum, and so with the other diseases. A person who has been sick from any contagious disease is liable to convey it, so long as he has any discharge from the nose, mouth or bowels, due to the disease. Mere discharges sometimes continue a considerable time after the patients are apparently well.

Typhoid fever is the disease which has most frequently, of the above named diseases, been traced to contaminated milk. This may be due to the fact that the germ has a greater vitality and lives longer than the others, because it is more generally prevalent, and is more commonly unrecognized than the other named diseases. From dirty hands it passes to the milk in the act of milking, or in handling the milk or in washing the utensils. In a recent epidemic at Carbon-dale, Pa., a man with "walking typhoid fever" washed his hands in the tank in which the milk was cooled, and from this source, the germs appear to have gotten into the milk.

Another way in which milk is undoubtedly contaminated at times, is by cows standing in sewage-polluted streams. These polluted streams may be found near almost every town and village in the State, and as almost every community has at least a few cases of this disease every summer, and as excreta are generally disposed of in the readiest manner, this means of contamination becomes a highly probable one.

III. DISEASED ANIMAL PRODUCTS.

Fortunately for us, comparatively few diseases, which affect domestic animals, are transmitted to mankind. The cow and the sheep have tuberculosis is true, but the writer fully believes that it is extremely rare, that this disease is ever passed to a human, either through the milk or flesh of such animals. The possibility of such transmittal is not denied.

Cattle suffer from anthrax. The hides from animals dead of this disease are saved in some countries, and occasionally cause the disease to appear among tanners in this country, showing that the germ possesses great vitality. Probably no one in the United States would think of removing the hide of an animal dead of anthrax. Such animal carcasses should either be completely burned or buried six feet below the surface of the ground.

In some parts of the South and West cows suffer from what is called "milk sickness." The disease is unknown in Pennsylvania. Animals having this disease transmit it to mankind in milk, butter, cheese and flesh.

Milk and cheese (as also ice cream) sometimes undergo a decomposition which develops a deadly poison called tyrotoxin. Such products are so poisonous as to be totally unfit for human food. All decayed or tainted animal products are unfit for human food and are sometimes dangerously poisonous. Pigs sometimes suffer from a minute worm called the *Trichina*. Salting and smoking the meat does not kill the worm, which is invisible to the naked eye, and which, when introduced into the human body, causes a fatal disease, somewhat resembling inflammatory rheumatism. There is no way of distinguishing animals affected in this manner when alive and the only sure way of avoiding it is to eat all forms of pork, only after it is well cooked, never raw or partially cooked. Chickens suffer from Roup, a disease resembling diphtheria. All such birds should be killed and buried deeply.

When a contagious disease invades a farm house, the dogs and cats belonging thereto should be tied up until the disease has fully disappeared.

The CHAIRMAN: The next number on our program is the report of the Entomologists; first that of Prof. D. J. Waller, of Indiana, Pa. Is Prof. Waller present?

The SECRETARY: I received a letter from Prof. Waller and he declined the appointment and asked that somebody be appointed who is a specialist in that line.

The CHAIRMAN: Next upon the program is Prof. Franklin Menges, of York, Pa. Is Prof. Menges here?

The SECRETARY: Mr. Chairman, I have not seen Prof. Menges to-day although it was expected that he would be here.

The CHAIRMAN: The next number upon the program is the report of Prof. H. A. Surface, Ornithologist, of Harrisburg, Pa.

The SECRETARY: Mr. Chairman, Prof. Surface is not in this city at the present time.

PROF. MILLER: Mr. Chairman, I will state that I have Prof. Surface's report and it can be read or you can file it if you wish.

It was moved and seconded that Prof. Miller read Prof. Surface's report, which was agreed to, and it was accordingly read, and is as follows:

REPORT OF THE ORNITHOLOGIST.

BY H. A. SURFACE, Harrisburg, Pa.

Sometimes the Specialists on the Board wonder why they were appointed, what are their duties, what is expected of them, and what their reports should include. The Ornithologist finds himself in this condition of inquiry at present, especially as no member of this

Board has during the past year sent him any statements concerning birds or made any ornithological inquiries of him, as far as his records show. If the members of the Board be interested in Ornithology and desire a good report on this subject, they are respectfully urged to contribute records of their observations and to make such inquiries along this line as will indicate their interest and the trend of their thought.

We are able here to give a resumé of our ornithological observations in Pennsylvania during the preceding year, and hope that this may be accepted as a report by your Specialist, and as evidence of his continued interest.

One of the most remarkable achievements of the past year was the legislation enacted in what is now known as the new game bill, which placed blackbirds on the list of game birds, and permits gunners to shoot them from the first of September to the first of January, protecting them at all other seasons. We should also call attention to the list of unprotected birds. This is as follows: The Blue Jay, English Sparrow, Kingfisher, Cooper's Hawk, Duck Hawk, Sharp-shinned Hawk, Goshawk, Pigeon Hawk, Great Horned Owl and the Crow. These may be destroyed in any manner and at any time throughout the entire year, but all other birds are protected at all times, excepting game birds, during their respective seasons, and such other wild birds and mammals as are found in the act of destroying property. They can be killed while in the actual destruction of property, but at no other time. We find it necessary to emphasize the point that all other birds are as certainly and definitely protected by law at all times in this State as though they were known to be the most melodious song birds or the most valued insect-eaters, and it is not only against the law to shoot or trap them, but if they be native birds of this State it is illegal to keep them in cages, or to have in possession their eggs, or their tanned or cured skins or any parts thereof unless taken legally in this Commonwealth. Thus, it is illegal to shoot any kind of Owl, excepting the Great Horned Owl, and it is also illegal to shoot either species of Eagle, the Red-shouldered Hawk, the Red-tailed Hawk, the Pigeon Hawk, or any other species of supposedly obnoxious bird in this State, not named in the above list, unless it be found in the act of destroying property at the time it is shot.

During the past year we have noticed more than ever the tendency of people in the country to shoot Hawks and Owls and other birds and nail their bodies to farm buildings or fences. This is to be regretted, as it is resulting in the destruction of the chief enemies of field mice and voles, which are certainly increasing very rapidly. During the past winter thousands of trees were destroyed by mice, particularly the short-tailed meadow vole, and many reports reached us of mice destroying Indian corn and other grain in the field. Until the relentless warfare upon their winged enemies has ceased, we can hope for no modification of such reports.

The new law also makes the remarkable provision that no citizen can enter into the business of rearing the birds commonly known as Quail and Partridge, or Pheasants, without paying to the Game Commission a fee of five dollars (\$5.00), filing a bond of five hundred dollars (\$500.00), presenting certificate of character signed by at least two well known citizens, filing description of his premises, etc.

From few correspondents in the Eastern portion of this State we have received increasing complaints of attacks on fruits by Robins. These are due partly to the increase in the number of Robins, but more to the decrease of the native fruits upon which the Robins previously fed. This can be prevented by the following means:

I. Temporary.—(a) Placing stuffed birds in fruit trees at the season when the fruit is becoming ripe and Robins and other birds are liable to take it. Prof. Buckhout, the Botanist of this Board, reports to us a successful experiment in thus protecting his trees by placing in them a stuffed Owl and a stuffed Crow last spring. (b) Placing in the trees a cat in a large lattice box or cage. It is probable that this would be even better than the stuffed bird, and as a suitable box could be made of lath, the house cat could be used for this purpose and thus save both the fruit and the birds. (c) Shooting among the birds with blank cartridges. (d) Killing them while engaged in destroying fruit. (This is to be used only as a last resort.)

II. Permanent Means.—Plant such fruit-producing native plants, bushes and shrubs as the birds prefer. Among these may be wild cherries, blackberries, raspberries, and especially the service or shadberry, also known as June berry and Corinthian Cherry, and Mulberries. The Governor Wood Cherry and sweet varieties of strawberries may be permitted to become dead ripe and the birds will prefer these to others of more choice varieties.

There have been some reports of attacks upon English walnut by English sparrows, Robins, and Blackbirds. Mr. Gabriel Hiester, of Harrisburg, has had many bushels of English walnuts destroyed while yet young and soft on the trees by Blackbirds sticking their bills into them, and appearing to use their juice as an insecticide.

The English Sparrows have continued to commit depredations and even found new fields to conquer. They have been known to attack young English walnuts in Lancaster county; in several gardens they have stripped the vines of green peas: they have been seen to eat the buds from the twigs of pear trees in the early spring, and last June we saw them kill all four of the young birds in the nest of a Phoebe. They have rightly been charged with being the greatest agency in the spread of the San José Scale, while there are very few reports or observations in their favor. Among these are such as their feeding insects to their young and occasionally catching moths for themselves in the grass.

In some of the sparsely settled portions of the State, near forests, the Ruffed Grouse, commonly known as the Pheasant, has been known to inflict some injury upon apple trees by eating the buds during winter and early spring. It is well known that the winter food of these valued game birds consists chiefly of the buds of trees, particularly the catkins or undeveloped blossoms of the birch, alder and hazel.

The English Starling, which was introduced a few years ago, in the vicinity of New York, has found its way into our State and in Centre county we have seen and collected a few of these birds in the fall of the year. They are to be known by their close resemblance to the Blackbird, but slightly smaller and streaked with brown, and also by their peculiar short whistle and their habit of living singly or in pairs in open fields and flying into trees or bushes when ap-

proached. At present we do not regard the introduction of the Starling as beneficial to the interests of the farmers, as we believe that this bird has the possibility of proving to be a serious pest in grain fields without adequate returns for insects eaten. We hope this suspicion may not be fully confirmed, but time and careful study can only give us the correct answer.

During the past year your Ornithologist has delivered no less than ten illustrated lectures upon Birds, using colored slides, which were apparently appreciated by the audiences. He has also issued several publications upon the economic features of our birds, the last being his Monthly Bulletin for December, 1905, dealing with the Flycatchers. He regrets that it has been found necessary to reduce the amount and expense of public printing, and in so doing, the Quarterly Zoological Bulletins were curtailed. However, such ornithological facts as have been published in the Quarterly Bulletins of the Division of Zoology will be continued in the Quarterly issues of the Zoological Monthly Bulletin. Within a few months one number will contain a full discussion of the economic features of the Crow, Blackbirds and Jays. As we need help in the form of specimens to study in the preparation of this important publication, we here invite all members of this Board and their friends to send us such specimens of the Crows and Jays as they may be able to procure during each month of the year and also Blackbirds during the season when they can be legally shot. These may be sent by express to us at Harrisburg, at our expense, or by mail when postage will be refunded. Always attach the name of the sender and the date and locality when the specimen was killed. Since the fundamental object of these studies is the examination of the stomach contents, living birds are not desired. We also wish to request all interested persons to send such other species of birds as they may find dead or be able to collect legally without sacrificing valuable life for this particular purpose.

We wish to urge members of this Board to make all possible observations upon the habits of birds in their regions, respectively, particularly in regard to their economic features or their relation to mankind, and report the same to us in writing. If members from the different portions of the State would co-operate in making such observations and reports, it would not be difficult for your Ornithologist to prepare an annual report that would really be a valuable synopsis of the ornithological conditions, especially in regard to agriculture, within the State during the preceding year.

The CHAIRMAN: You have heard the reading of the report. What is the pleasure of the meeting?

It was moved and seconded that the report be placed on file.

Agreed to.

MR. HERR: Mr. Chairman, the Committee on Credentials have a supplementary report to make. We have received the credentials of H. H. Hall, of Potter county, and find them correct, and I move that he be admitted as a member for three years.

The CHAIRMAN: You have heard the Report of the Credential Committee. What action shall be taken?

It was moved and seconded that the report be adopted. Agreed to.

The CHAIRMAN: The next thing on our program is the Report of the Committee on Dairy and Dairy Products, R. J. Weld, of Sugar-grove, Chairman.

Mr. Weld presented his report which was as follows:

REPORT OF COMMITTEE ON DAIRY AND DAIRY PRODUCTS.

BY R. J. WELD, Chairman.

To my mind there is no more sure way of maintaining and increasing the fertility of our farms than through the medium of the dairy cow. She has the ability to convert the rough, coarse, bulky products into a concentrated, finished, marketable article which carries with it a very small amount of the productive elements of our farms, while the residue from the feeds contains, to a greater or less degree, all the elements of plant production, together with those mechanical properties so much needed in the soil of most Pennsylvania farms. In Northwestern Pennsylvania, where for years the lumber and oil interests have pushed the dairy into the background I am glad to say that with the clearing away of the vast hemlock and pine forests, it became necessary to look to some other source for revenues, hence the old Pennsylvania scrub-oak cow has been replaced or improved by the introduction of better stock, the improvement of the rations fed and the better care and housing, so that to-day instead of having cows that give milk for 7 or 8 months, we have all the year around dairies returning to their proprietors a profitable income and furnishing employment for the farm force from January to January.

Since the dawning of the twentieth century, much attention has been given to the better housing of the domestic animals on our farms, the new stables are made warmer, lighter and better ventilated than those built fifty years ago. Instead of the old leaky wooden floors, water-tight concrete floors are constructed at a cost less than the cost of one thickness of plank, to say nothing of sleepers and double planking. Improvement in the selection and feeding of the cows is noticeable in almost every community. Young enthusiastic farmers appreciate the importance of knowing just what their cows are doing for them, and are applying rigid weeding processes to thin out the unprofitable individuals, thus raising the standard of their dairies and adding to the profit from the remaining animals. On the whole, the past year has been one of encouragement to the dairyman. The growing season was a favorable one for both pasture and crop growth. The water supply was abundant and no periods of extreme heat were encountered. Prices of beef, veal and pork, all adjuncts of the dairy, have been good, and the demand has been brisk.

The chief drawbacks to the year's success have been the scarcity of good reliable farm help and the high prices of mill feeds. The help problem is becoming more serious each year. Many of our farmers

are selling their property at a sacrifice or are doing what they can themselves and allowing the balance to go undone. This condition of affairs is very much to be regretted as it has a demoralizing effect on all farm operations. Any suggestion which the State Board of Agriculture may have to offer will be welcomed by our dairy farmers, for, unless the dairyman can secure reliable men who are competent and careful milkers, he had better reduce his dairy to such proportions as he can himself care for. My only suggestion is, fewer animals but better producers.

There seems to be a disposition upon the part of some millers and feed merchants to put on the market mixed feeds with flowery names rather to the exclusion of straight, unmixed feeds whose prices are steadily climbing up, making their use almost prohibitory when viewed from a profit-returning standpoint. I hope that the Secretary of Agriculture will keep the dairymen advised as to the character and composition of these mixed feeds so that we will not be imposed upon.

DAIRY PRODUCTS.

The products of the dairy have been in good demand all through the year and the prices have averaged a little higher than in previous years.

One feature of the year was the very high market price of butter in the early part of March, followed by a very sudden slump of nine cents per pound, followed within thirty days by an advance back to nearly the high prices of March, there to remain until the Spring production came in to supply the demand, when as a natural consequence, the market gradually lowered. Be the cause of this fluctuation what it may, the effect on the producer is not for his good.

What is true of improved conditions for many dairy cows is also true in the handling and manufacture of her products. Better facilities for the manufacture of dairy products are being introduced on many farms. Dairy rooms or separate dairy buildings properly located are displacing the old methods of creaming the milk in the living room or one adjoining it. Young men from all quarters are going to our Dairy School, there to be instructed in all that appertains to the production and manufacture of first-class dairy products. These men return home to put into practical use the knowledge they have acquired, and become leaders in dairy work in their several communities, thus improving the output of that section. Each year we see an extension of the territory from which the large cities draw their milk supply. This relieves the farmers home of the labor of manufacturing, and lessens competition.

I wish to call attention to the demand for small, rich, home-made cheese. If one is so situated that he has the requisite time to give to the manufacture of such cheese, and has a milk testing 45 per cent. butter fat or better, he will find this branch of the dairy both interesting and profitable. The equipment is not expensive, but the time required in the process of manufacture is greater than that required for butter-making.

Some instances have come under my observation of the over-salting of butter. Only a few weeks ago, a sample of what appeared to be very good butter came to my notice, which was nearly ruined by

over-salting. In my own practice I have found it necessary to reduce the amount of salt used from one quarter to one half.

Either the dairy salt now on the market has a larger per cent. of saline matter or consumers tastes have changed in this respect.

In closing, permit me to recommend to our Legislative Committee the need of a systematic dairy inspection service similar to that inaugurated by some of the dairy companies in our large cities, which shall include all dairy farms, creameries and cheese factories, the object being to raise the standard of all dairy products. Make them first-class and we need have little fear of the bogus products getting our markets away from us.

We would also commend the active and efficient work of the Dairy and Food Division of the Department of Agriculture.

The CHAIRMAN: You have heard the reading of the report. What is your pleasure?

A Member: Mr. Chairman, I would like to ask Mr. Weld how much salt he would recommend per pound for proper butter-making?

MR. WELD: Mr. Chairman, I would say that that depends a good deal on the taste of the people you are supplying, but it depends also a great deal on the way it is worked. Most of the people in my section have advocated the butter-worker. In my own experience I use the butter-worker, but they are not so taught in the dairy school. Formerly I used one ounce of salt to a pound of butter, and I had complaints of over-salting and I cut it down to a half-ounce. As I say, I do not know whether it is in the salt or in the taste. In my own town there has been quite a good deal of complaint this summer about over-salting, so that I am inclined to think there is a difference in the brands of salts. I had to change brands of salt. I formerly used what was called a Genessee salt, and I had to change to the Ohio salt, and I now use half an ounce to the pound with the exception of two parties who like more.

MR. HUTCHISON: Mr. Chairman, I move that this report be accepted and spread on the minutes, and then it will be before the house.

Prof. Van Norman was called for.

The SECRETARY: I think you had better let the discussion go on and then take action.

MR. HERR: The motion is that this paper be received and placed on file.

The CHAIRMAN: Yes.

MR. HERR: Why not put the motion?

The CHAIRMAN: I think it is entirely in order for the gentleman to proceed.

PROF. VAN NORMAN: Mr. Chairman, as to flavor in butter, there is a marked change demanded in the market. This demand now looks toward a milder flavored butter, and along with that milder flavor has come a lessening demand for salt. The flavor of butter is the result of fermentation.

With the advent of the dairy business in our Western states, and the necessity of shipping long distances to our Eastern market, butter makers soon recognized that the milder flavor the market would accept, the longer the keeping quality of that butter, and those influences have worked together to give us a milder flavor and at all events now, it is a milder flavored butter that is mostly marketed.

A Member: Has the abstraction of cream had any effect?

PROF. VAN NORMAN: Yes, I think so in some sections. I went into one creamery not long ago where the butter was ruined from over-ripeness, and the manager said, as he drew in a full breath, "That is the way I like to have it, with that fine aroma," and that butter would be ruined in two days and would not be accepted in the Philadelphia or New York market. As to methods, some are using the combination churn and some the butter-worker. We have been using in our work for the three years past, the combination churn.

A Member: Mr. Chairman, there was one point raised by Mr. Weld that is of some little interest, and that is the question of the variation in the qualities of salt.

PROF. VAN NORMAN: I have had occasion to examine a great many analyses of various kinds of salt brought from Ohio and elsewhere. Probably the true salt flavor is of about of the same strength in each salt providing the degree of moisture is the same at the time of testing, but salt varies a good deal in the other constituents although they are present in very small quantities, for example the chlorides of lime and of magnesia. Those are the constituents that are undesirable, making the salt tend to become moist too easily, and producing a very pronounced bitter flavor, and that bitterness may be four times as great in one salt as in the other, but in the ordinary normal salt flavor, there is really very little variation.

The CHAIRMAN: It has been moved and seconded that the report be received and placed on file.

The question being put, it was agreed to.

The CHAIRMAN: Our next topic as it appears upon the program is "Breeding Live Stock on the Farm," by Prof. Thomas Shaw, Professor of Animal Husbandry, University of Minnesota, St. Paul, Minnesota.

PROF. SHAW: Mr. Chairman and Gentlemen: As has been announced, I am to talk to you on the subject of breeding animals on the farm. I would like to ask at the outset how many talks you have ever heard on this subject? I think I am safe, gentlemen, in saying that you have never listened to very many, and why? It is because of the difficulty connected with talking on a subject of this nature to make it interesting to practical men.

I think I ought to be frank with you and tell you at the outset that I am not going to tell you many things, probably not anything that you don't know now about the subject of breeding live stock. You may say, why do you come down all the way from St. Paul to Harrisburg to talk to us people if you can't tell us something that we don't know? I answer that by asking why did you go to church last

Sunday? I trust you were there. You didn't go to hear something that you didn't know, but you went to be put in remembrance of what you did know, and I came down here to try and stir up your minds by way of remembrance. I tell you, gentlemen, the great difficulty with our farmers, is not so much in knowing enough, as in remembering what they do know.

Prof. Shaw then gave the following address:

BREEDING LIVE STOCK ON THE FARM.

BY THOMAS SHAW, Professor of Animal Husbandry, University of Minnesota, St. Paul, Minn.

In some respects the rate of breeding is like a great deep hole in which an intellectual giant may sink a thousand fathoms and more at the very first plunge. In other respects it is a broad shallow, in which a child intellectually may wade without any difficulty. In some respects the operation of its laws is so regular and plastic that the skilled breeder may almost mould and fashion at will. In other respects they are so erratic and subtle as to confound the most skillful, the results are so different from what he expected. The great differences thus resulting in some instances from even skillful breeding are doubtless the outcome of laws that are apparently antagonistic, but not really so. They are apparently so because they are not yet sufficiently understood. It may be that they never will be, but, happily for the breeder, the results from the proper application of principles that are now well understood are so regular and uniform, that the man who diligently applies them, will, with unfailing certainty, so improve the average of the animals in his stud, herd or flock, that they will be brought to a higher level.

LAWS THAT GOVERN BREEDING..

The known laws that govern breeding are three in number. They are known respectively as the law, that like produces like, the law of variation and the law of atavism. The first and second of these laws are apparently antagonistic. The third, like a pendulum in the operations, swings between the two.

The law that like produces like means that the progeny shall be like the parents, not an exact fac-simile, for two parents are never found exactly alike, but in all essential features there will be a close resemblance. This resemblance will, with more or less of uniformity, extend to the physical form, to function, to habit, to disposition, and indeed to every feature of the organization. This law is the great magna charta of the breeder. The results from the operation of this law are by no means uniform. They will nearly be so, however, in proportion as the parents have been purely bred, in proportion as they have been bred in line without having reached the danger point of weakened stamina, and in proportion as the parents are strong and vigorous.

The law of variation, or the law that like does not always produce like, is apparently antagonistic to the law of variation. It means that

the progeny shall not always be like the parents, though apparently antagonistic to the first law, it may be simply a part of the same. The differences being the result of modifying factors in transmission as yet not well understood, and until understood, beyond the control of man. In breeding pure blood animals these differences are not usually very well marked, though they are constantly present. Sometimes they are very great, as when, for instance, the progeny of horned parents are hornless, but such variations are of infrequent occurrence. Some have claimed that in transmission variations are more constant and greater than resemblances, in other words, the second law of breeding operates more strongly than the first law. In breeding pure bred animals, this is not true. If it were so, the breeder would be on an uncertain sea, without sail or rudder. The only improvement that he could make would be through selection.

The presence of the law of variation is by no means inherently adverse to improvement in breeding. The result depends first, on the character of the variation, and second, on the disposition made of the animals which thus vary. Variations are sometimes downward, in other instances they are upward. When downward the animals should be eliminated. When upward they should be retained for breeding. Were it not for variations, in the direction of improvement, advance in breeding would be impossible. Viewed from this standpoint the law of variation is a blessing rather than the thorn which it sometimes proves to be.

The law of atavism is the law which, in transmission, determines that the progeny shall be like some remote ancestor. It is probably a branch of the first law of breeding acting in a erratic way. Like the law of variation, it is a disturbing factor in breeding. But it is more disturbing than the former in that it introduces variations that are undesirable. It resurrects from out the dead past what the breeders have been trying to eliminate. The frequent occurrence of a white calf in the breeding of Shorthorns, which the breeders have been trying to avoid for generations, illustrates the disturbing character of this law. It may be that its existence is intended to compel the breeder to give careful attention to purity in blood lines, since its power wanes in proportion to the increase in the duration of the period covered by pure breeding.

Having thus briefly outlined these laws, the effort will be made to enlarge on some feature of their practical application to the operations of the breeder and also of every farmer who breeds even one animal on his farm. The points that will be more particularly dwelt upon are those which relate to the evidences of prepotency in sires, to the improvement of live stock through up-grading, and to the futility of promiscuous breeding in so far as it relates to the improvement of live stock.

PREPOTENCY IN THE SIRE.

Prepotency means the power possessed by a parent to transmit individual and breed properties to the progeny. The measure of its strength, however, is more evidenced in the former than the latter. Thus it is that prepotent sires produce uniformity in the stud, herd or flock. The uniformity thus produced is proportionate to the prepotency of the sire and the excellence of the uniformity is at least measurably proportionate to the excellence of the individuality in the

sire. The importance, therefore, of possessing good and prepotent sires, cannot easily be over-estimated. The truth that the sire is half the herd is only a half truth. He is as much more than half the herd as his prepotency exceeds that of each female parent in the same.

But how may it be known that a sire is prepotent before his prepotency has been actually proved, as evidenced in the offspring. The answer to this question is of all absorbing interest to the breeder, for sires are usually chosen before they have begotten progeny. This raises the question as to the probable guarantee of prepotency. These include purity of breeding, line breeding in degree and individual vigor.

Other things being equal, a sire is prepotent in proportion to the duration of the time that he has been bred pure. This result follows from the continuous increase in the dominant blood—elements with increase in duration in breeding without the introduction of alien blood. Whether there is a time limit to this increase is as yet an unsettled question. In other words, it is not yet certain that an animal from an ancestry bred pure for a thousand years will be appreciably more prepotent than an animal bred from an ancestry kept equally pure for five hundred years. These dominant blood elements having become thus fixed and stable, are transmitted with at least reasonable certainty to the progeny.

Other things being equal, a sire is usually prepotent in proportion as he is line bred or otherwise. Line bred means bred within the limits of one family for at least several generations. The closer the relationship at the outset of the line breeding and the longer the duration of such breeding the more prepotent the sire is likely to be. For instance, suppose a Shorthorn sire is chosen from the Missie family of Cruikshank Shorthorns. If the said sire is chosen amid progeny bred for generations from Missie sires and dams, no other Shorthorn blood meanwhile having been introduced, the line is likely to be more prepotent than if drawn from progeny whose ancestry included members of various families of Cruikshank Shorthorns.

Other things being equal, prepotency is strong in proportion as the sire is possessed of inherent vigor. This is in keeping with that other observed fact, that usually prepotency is stronger in an animal when at that age in which bodily vigor is greatest, rather than at an earlier or a later period in its life. The evidences of bodily vigor are form and action. The latter is usually spoken of as carriage, and as an evidence of prepotency, it is probably some more important than bodily form. The evidences of bodily vigor are such as relate to strength and vigor for the breed. The most prominent of these, probably, is not chest size so much as chest capacity. Vigor in action may be nicely illustrated by observing the carriage of a Southdown male. The vigorous male steps quickly. He carries his head proudly. His full eye observes everything. The slightest sound causes him to prick up his ears. Such a male purely bred is almost certain to be prepotent.

But what is meant by other things being equal? Simply this, that with each of the indications mentioned, the other indications shall be present in at least fair degree, and that the parents and progeny shall both be sustained with suitable food, fed in liberal, but not in excessive supply. For instance, long purity of breeding will count far more if linked with line breeding and bodily vigor, and so of each

of the other indications, and all these will be more potent when the feeding and management are favorable to high development.

In addition to the indications mentioned, the performance of the immediate ancestors for several generations should be carefully noted. By performances is meant what the animals have done in speed attainment, milk, meat or wool production, according to the end for which they are kept. Nor should the fact ever be lost sight of, that high performance in the ancestry is valuable as it is near, and less valuable as it is remote. High performance in the immediate parent of a sire is of great value, but high performance in an ancestor of ten generations in the upward line of ascent is of but little account. This will be readily apparent when it is remembered that the blood properties of an ancestor of ten generations previously, are only present in an infinitesimal degree.

The claim, therefore, that an animal traces to some famous ancestor of many generations back, is of but little account. It can only deceive those who do not know. Excellence in performance in the near ancestry is not only valuable, but it is valuable in proportion as it is uniform in the near ancestry and far reaching in its comprehensiveness. By uniformity is meant evenness of performance in all the near generations, and by comprehensiveness the extent to which various desired qualities are present.

IMPROVEMENT THROUGH UP-GRADING.

By up-grading is meant the improvement of common stocks through the use of successive sires chosen from one and the same pure breed. For instance, when common females, it may be of mixed breeding, are mated with a pure bred Holstein sire, and when the female progeny continue to be thus mated in succeeding generations, the product are termed grade Holsteins, and when this line of breeding is continued for several generations, they are termed high-grade Holsteins. When good and prepotent sires are chosen, it is in a sense wonderful how quickly common stocks will be improved, providing the food given is suitable and the care of the animals is proper.

When the process begins, mixed blood elements in the females is no detriment. It does not stand in the way of quick improvement. In fact the reverse may be true, since every additional blood element lessens prepotency in the female. In other words, the less purely bred she is, the less the power that she will have to transmit her own properties. Consequently, when mated with a purely bred prepotent sire, the preponderance of resemblance in the progeny is to the sire. The preponderance in all essential properties will come from him also, and in both instances, because of his superior prepotency.

Analyze further this up-grading process. Suppose the foundation female is a ewe secured from the range and that she is possessed of the blood elements of a dozen different breeds. She is mated with a prepotent Southdown male. Let the difference in blood elements or properties between the two at the outset be represented by 100. The first thought would be, that 50 per cent. of the properties or elements in the progeny would be inherited from the dam and the same from the sire. That is not true. More than 50 per cent. of those properties come from the sire, as many more as the prepotency of the sire in

virtue of his purity of breeding exceeds that of the dam. Less than 50 per cent. of those properties come from the dam, as many less as her prepotency or power to transmit her properties is less than that of the sire, as a result of her mixed breeding. The preponderance in properties in the progeny inherited from the sire will exceed those inherited from the dam, as much as the power of the sire to transmit his own properties because of his strong prepotency, exceeds that of the dam to transmit hers, because of her weak prepotency. This explains why, in the first instance of such mating, the progeny bear so strong a resemblance to the sire.

The difference in blood elements at the first, as previously stated, may be represented by 100. Now, since the progeny inherits far more largely in such breeding from the sire, the difference in those blood elements will have been reduced more than 50 per cent. So far as the sire is concerned, the progeny will be possessed of far more than 50 per cent. of inherited properties from him. The exact per cent. represented by such inheritance cannot be exactly stated, but it would be approximately correct to say that 75 per cent. of properties in the progeny were inherited from the sire, which would leave 25 per cent. of the same to be inherited from the dam. Thus a great stride has been made in the very first mating. The difference in blood elements now between the Southdown sire and progeny will be represented by 25 instead of 100 as at the first.

Mate with a Southdown male again and the progeny of the second generation will be possessed of approximately 90 per cent. of Southdown properties; of the third generation of approximately 97 per cent, and of the fourth generation of approximately 99 per cent. The progeny of the fifth generation will, in individuality and useful properties, be practically equal to pure bred Southdowns. This wonderful transformation may be accomplished in five generations of such breeding. In other words the entire common stock of farm animals in the United States could be transformed within the time named into pure breeds, that is into animals as good as pure breeds for practical uses. At the present time, however, the supply of pure bred sires would be far too little to accomplish such an end within the time.

Suppose that instead of pure Southdowns, grade Southdown sires had been used. If the prepotency of those sires in each instance exceeded that of the dams with which they were mated, then there would be improvement. The improvement would be proportionate to the excess of that prepotency. But even on the supposition that the prepotency of each Southdown male was superior, variable elements would probably appear in the progeny as the outcome of these elements in the sires, and these would in some instances at least make improvement slower, while such sires were used, the level of improvement reached would never equal that made in the former instance, and improvement would be made very much more slowly. The advantage, therefore, and profit from using only pure bred sires is clearly apparent when these can be secured without excessive cost.

Suppose, again, that the Southdown sires had been inferior individually, though purely bred, what would have happened? Why, because of their prepotency the result of the purity of their breeding, they would sustain their own individual superiority on the progeny. This might not have followed in some instances because of the influ-

ence of atavie transmission, resulting in bequeathing properties to the progeny possessed by superior ancestors. As a rule, however, the transmission would more or less resemble the inferiority possessed by the sire. The breeders of grades are usually content with a very common or inferior pure bred, because of the cheaper cost, but to invest in such is clearly a mistake. The place for all those inferior sires in the block in the case of meat-making animals, and in the dray or van in the case of horses. The breeder who chooses sires thus, makes a grievous mistake. An inferior sire is dear at any price. He is dear as a gift. The extent to which such sires have been used by the breeders of grades has greatly retarded live stock improvement.

The view so widely held that while the progeny of the first mating are a great improvement on the females from which they are bred, the progeny of the second mating, and also of succeeding generations, is likely to be inferior, is a fallacy. In up-grading such a result would be clearly impossible. The improvement will be continuous until the level of the breed is reached from which the sires are chosen. It is in cross breeding that such results sometimes follow, that is when sire and dam are mated, each strong in the blood elements of a different pure breed. In such instances, usually, but not always, the progeny is at least the equal of the sire or dam in useful properties, but not in prepotency. The improvement is probably the result of the renovating influence that would seem to inhere more or less in introduced alien blood. In succeeding generations, however, there may be a tendency to revert to one or the other of the two breeds thus mated, thus leading to uncertainty in the results and sometimes to retrogression.

PROMISCUOUS BREEDING.

What may be termed promiscuous breeding, is the style of breeding most commonly practiced. The average farmer chooses a sire from a certain breed, it may be on the ground of convenience or because the breed for the time being is popular. Soon another breed becomes popular and a sire is chosen from that breed. It may be that in a life time sires have been used from half a dozen breeds.

Now see what this means. Suppose, for instance, a pure Jersey sire is mated with a grade female of breeding that is much mixed, far more than 50 per cent. of properties in the progeny will be inherited from the Jersey. Suppose that now a pure Holstein sire is used in mating with the female thus begotten, the progeny will possess more than 50 per cent. of Holstein properties, but the Jersey properties will be proportionately eliminated. Suppose, again, that pure Shorthorn sires are chosen to mate with the grade Holstein males Holstein properties will be proportionately reduced and the Jersey properties will be still further eliminated. Those who breed thus are like the man who, as he walks up the hill, walks down again, or like him who sails continuously in a circle. At the end of a lifetime of such breeding the breeder will find himself just where he was when he started.

Up-grading is the true system of improving live stock. Cross-breeding, that is the mating of two distinct breeds, should have but little place in the operations of the farmer. It may be advantageous in some instances as when the dams and their progeny are to go to

the block. It may be profitable for instance to cross aged Merino ewes with males of some better mutton breed and to prepare both for the market by fattening them on rich pastures, but ordinarily such crossing should stop with the first cross. To carry it further would, probably, for a time at least, introduce elements of reversion.

But, it may be asked, are there no instances in which alien blood may be introduced with animals that have been up-graded? There are such instances as when the animals thus graded have partially lost some useful property or properties. It is possible to restore those properties or at least to improve them greatly in some instances by the introduction of an outcross, that is by making one cross from sires of another breed.

This may be illustrated in the condition of many of the high grade herds of Poland Chinas in the corn belt at the present time. Many of these have too little bone, too little stamina and weakened breeding properties. One cross from sire of either the large Yorkshire or Tamworth breeds would lead to wonderful improvement along these lines. The breeders could then fall back again upon Poland China blood if they desired to do so. Such teaching may sound like rank heresy to some, but that it rests on a sound basis will be found by all who put it to the test.

The way to improve the average stocks of the country is, therefore, so plain that any can understand. It is so entirely feasible that all may practice it, and it is so inexpensive, comparatively, that every one may adopt it. But the thought should ever be present, that in all up-grading the food must be adapted to the needs of the animals, otherwise the improvement sought will be hindered in proportion as such adaptation is lacking.

The CHAIRMAN: Now gentlemen, if there are any questions that you want to ask the Professor, this is the opportunity. He is here as he has said, to help us all he can.

DEPUTY SECRETARY MARTIN: Mr. Chairman, I would like to inquire, since dairying is one of the most important industries of Pennsylvania, if it is wise for a dairyman in building up his herd, to use a sire in what we call line breeding?

PROF. SHAW: Yes, I think it would be wise as long as he does not reach the danger line, the line of individual deterioration, or lack of stamina, or loss of vigor; I think it is perfectly safe until that point is reached.

MR. WELD: I would like to inquire of Prof. Shaw what his views are, if we take an ordinary cow—if we wish to build up in a certain line, and get a good thoroughbred sire of some desired breed, how many crosses is it safe to make with that sire; how long is it safe to keep him before you get another one from a different family?

PROF. SHAW: I will answer that question in this way. Understand, gentlemen, that I was not advocating inbreeding for the ordinary farmer. Now this question bears upon inbreeding rather than upon line breeding; the two things are different. Now I would answer the question in this way, that if a man has a herd of rugged cows, and if he chooses a sire that is rugged and right, that he can

with profit use that sire on two generations, but unless those conditions are present, he might make a very serious mistake. Now the ordinary farmer does not observe closely enough to enable him to do these things right, and for that reason I do not recommend the ordinary farmer to practice inbreeding at all.

The SECRETARY: Isn't it true that if you have vigor and stamina and strength on both sides, that by inbreeding you are likely to intensify it?

PROF. SHAW: Yes, exactly.

The SECRETARY: And if there is some weakness you are likely to intensify that weakness?

PROF. SHAW: Yes.

The SECRETARY: You think it to be dangerous to undertake inbreeding without special study and qualifications for it?

PROF. SHAW: I think so; I never recommend it to the average man who has not given attention to this question.

DEPUTY SECRETARY MARTIN: Would it be a good practice for a man having thoroughbred Jersey cows, to use a thoroughbred Guernsey sire for these cows?

PROF. SHAW: That would depend on what he was seeking to accomplish. If he intended to go on breeding Guernseys I see no objection to it, but to introduce Guernsey blood once and then go back again to Jersey, I do not see any reason why he should do that.

MR. HUTCHISON: Don't you think he would do better to breed along the Jersey line?

MR. SHAW: Yes, by proper selection; that is my way of doing it.

MR. HUTCHISON: How do you account for breeding a mare weighing 1400 pounds and getting a big, rough animal weighing 1800 pounds?

PROF. SHAW: What was the breeding of the mare?

MR. HUTCHISON: I don't know about that.

PROF. SHAW: There I imagine would be the difficulty. If the ancestry of that animal was not known, it is probable that some one of the ancestors was of that character, and this possibly would be an instance of reversion of that kind.

The SECRETARY: Is there any way in which a breeder can control or influence sex? What I mean is this; you know that a man who is breeding for beef wants males, and a man who is breeding for dairy purposes, wants females.

PROF. SHAW: Practically, I would say, no. Now, when I say that I do not want to be understood as saying that a man can do absolutely nothing with reference to that; I do not want to say that, because I am inclined to believe that stamina and vigor have some influence, but not enough, to make it absolutely certain that

in all cases you are going to get what you want; I think they have a little influence. I think that nutrition has a little influence, but it works so uncertainly that it is difficult to say that we are going to know what we are going to get. You will notice that at some seasons lambs come almost entirely males, at other seasons they come almost entirely females. I cannot think that is the result of blind accident; I cannot help but think there is something in the character of what those sheep feed on that exercises an influence, but after all, there is so much of uncertainty, that I question very much whether it is worth any man's while to spend his time on it.

MR. HUTCHISON: Isn't that one of the mysteries that has never been solved?

PROF. SHAW: It may be deemed one of the mysteries that has never been solved, and I almost think, for the sake of the human race, it is a good thing that it has not been solved.

MR. HERR: Some of our dairymen breed from a Jersey sire and a Guernsey dam, with the idea of using the dam to get quantity, and the sire for quality, when they are breeding particularly for milk purposes.

PROF. SHAW: I imagine to a certain extent they will get both. But what are they going to do next time? If they go on with the Jersey sire, in a little while their animals will be virtually Jerseys. By simply making one cross I think they can get to a considerable extent what they want.

MR. RODGERS: How many crosses on Holsteins can you make before they will be pure bred Jerseys, starting with a Holstein dam and a Jersey bull?

PROF. SHAW: It would be several generations, because you see, the dam, to begin with, was purely bred; there would be a greater power of resistance. It would probably take a number of generations, probably two or three or more.

The SECRETARY: I have heard the statement that there is not any danger with pure bred sires until you reach the sixteenth generation. Is there any such limit fixed by principles you have any knowledge of?

PROF. SHAW: No, I do not think so; I do not think that is correct.

PROF. HAMILTON: What value would you place upon the Guignon theory?

PROF. SHAW: I do not lay much stress on it—on its possession. Suppose you had two animals that were exactly evenly matched except in that one particular, I would give the preference to the one that had those indications in a marked degree over the other.

A Member: Do you believe the secretions would indicate the butter fat contents of the milk?

PROF. SHAW: I think so, to some extent. I would not say that they would be an absolute guide, but I think they are to some extent an indication.

A Member: Has the time of service of the female anything to do with the progeny, whether male or female?

PROF. SHAW: Absolutely nothing.

A Member: I did not understand the question.

PROF. SHAW: The question was as to the time of heat in a female, whether it has any influence in determining sex. I say absolutely none. Now when a male is running with the females of the herd we can naturally suppose that the service takes place at the earliest time possible. Now what do you find? We find some seasons that almost every animal born is a male, while in other seasons in the same herd, almost every animal born is a female.

The SECRETARY: So that the theory that if you want males, you must wait until the period of mating is nearly closed, goes for naught also?

PROF. SHAW: Exactly so.

MR. HUTCHISON: Is it not true that some cows will have almost all male calves, and others almost all female calves?

PROF. SHAW: That is certainly true; some cows will produce nearly all males, some almost all females, then on the other hand, some sires will beget a great preponderance of females and other sires a great preponderance of males. What the reasons are, we do not understand.

A Member: In this question of cross-breeding, isn't it a fact that in crossing the Jerseys and Holsteins, we are likely to get a progeny partaking more of the Jersey qualities than of the Holstein?

PROF. SHAW: I have not had experience or observation sufficient in connection with line of breeding to answer that question satisfactorily to myself.

MR. HERR: Which would you say was the better, to cross the Jersey male with a Holstein female, or the reverse?

PROF. SHAW: That depends upon what you want, and it depends to some extent also on the individual animals, how that thing should be done. Now I would answer that question in a general way by making the statement that sometimes it has been found better to use the sire of one breed for that crossing, and the dam from another, where it can be done, as the results have shown that that is the best way of doing it. But to reason beforehand that it would be so, would be an impossible thing; the fact has been observed, but the reasons for the fact are not known.

MR. WELD: In breeding can we influence the size or the number of offspring in any way?

PROF. SHAW: I would say that I think we can influence the number of offspring in the litters from swine, and I think we can in sheep, by the way in which we manage the mating; I think we can influence it to some extent, probably not to the extent that we desire. It has been noticed that when both sire and dam are improving at the time of mating—that is to say they are building up, they are getting more flesh, they are gaining in vigor, they are likely

to produce a more numerous progeny than if they were not in that condition when they are mated.

The SECRETARY: In feeding swine, don't you think if brood sows are fed on foods that are rich in protein, that it will increase the progeny?

PROF. SHAW: Yes, and that is a matter of breeds, also.

DR. SCHAEFFER: I would like to know what in your opinion is the difference in the weight between the Jersey and the Guernsey family—the average?

PROF. SHAW: I think it would not be less than a full hundred to a hundred and fifty pounds; of course we can only answer that approximately.

A Member: I want to ask you whether breeders pay any attention to the so-called Mendel's law in biology. The Dean of Illinois University told me not long ago that Burbank of California ignores Mendel's law altogether in improving the fruits and flowers that made him famous. Now is there any attention paid to Mendel's law in breeding?

PROF. SHAW: In practical breeding I do not think there is by the ordinary breeder. There may be a few scientists that are giving it some attention, but that law, so far as applied to animal life—it is advantageous in a tentative stage to consider it, but it is not universally accepted by practical breeders; I do not think it is practical at all.

A Member: Can you state what Mendel's law is?

PROF. SHAW: Well, gentlemen, I am not going fully into that, for there is not time, but in breeding, the transmission takes place as it were, in physiological units. To illustrate, suppose you get a sire that has no horns; probably his ancestors in a near generation may have had horns. Now in ordinary reasoning, we imagine there would be some danger that when that sire is used, that his progeny would have horns. Now according to Mendel's law, that sire can reproduce horns because of the character of the transmission which he has inherited.

A Member: On that question of mating Holsteins and Jerseys, I would like to inquire how many ever saw four or five good cows produced from that cross in the same herd?

PROF. SHAW: You are talking now about crossing pure breeds, are you?

A Member: Yes, the question was asked whether you could do it and get the quality of one and the quantity of the other. I say, how many ever saw four or five good cows produced in the same herd from that crossing?

MR. HERR: It is a custom, I know, among some of our dairymen who are selling milk. Their idea is to get very rich milk and yet have a good deal of it, and they cross Jersey sires with Holstein dams, and for the first generation they seem to reach good results.

They are not breeders, but they simply keep the Jersey sires for the purpose, and I wanted to know whether it was a good or bad practice.

PROF. SHAW: Mr. Chairman, there is this feature of breeding which is very important; take it in the raising of sheep. Now suppose you began with a Lincoln sire instead of a Southdown, and you kept your sheep in those mountains where the pasture is so short that the sheep would have to skip about and go all day in order to get enough pasture. You would probably find that you would succeed poorly in doing that thing, because the Lincoln cross would give an impulse in the direction of size, which the food did not sustain. You have got to give attention to the question of feed, that you give to the animals when you set out to make these changes.

MR HERR: I would like to ask the Professor if the first impregnation in a heifer or cow will influence subsequent impregnation.

PROF. SHAW: A first impregnation in a female does sometimes influence succeeding impregnations; a first impregnation of a female does sometimes influence every succeeding impregnation; a first impregnation in a female oftener does not influence any other impregnation. The certainty of influence is stronger in proportion to the prepotency of the sire causing the first impregnation.

The SECRETARY: Then if we have been raising mules, we can take the same mare and raise horses without having any fear that they will be influenced by the original impregnation?

PROF. SHAW: I would say that is probably the strongest illustration of the influence of the first impregnation on the progeny. In mules you will find that stronger than any other kind of breeding that I ever heard of or read of.

MR. HERR: I had a heifer bred of horned stock, and she at first produced a calf with horns; at the next impregnation, she seemed to have bred way back and produced a muley calf.

PROF. SHAW: Did she go on in that way?

MR. HERR: No, nothing subsequent to that that I know of.

PROF. SHAW: That illustrated the influence that you referred to.

MR. RODGERS: On the question of color, will it have any influence upon the color of a colt. Suppose at the time of the conception of a mare, an object of a certain color appears before the mare, is there or isn't there danger that the progeny may inherit some of those color characteristics?

PROF. SHAW: I would answer yes; sometimes there is. The danger is considerable, but of course in a great preponderance of instances it does not follow, but it does follow often enough to make the matter of importance on the part of the man who is breeding good and valuable stock, for that sort of thing should be avoided.

A Member: At what period of conception may that thing take place, Professor?

PROF. SHAW: Well, I imagine that it must take place about the time of the conception. There are other influences, of course, such as the influence of some sudden, mental impression on the mind of the pregnant animal. That influence may take place a good long while after conception.

MR. SEXTON: You have been talking about breeding animals for the dairy. Now in breeding animals for beef, is it necessary to be as careful in breeding for beef as it is for the dairy?

PROF. SHAW: I would answer that in the affirmative; but would qualify it by this statement, that I think it not so difficult to breed for beef as to breed for the dairy, because there are additional factors that have to be considered in breeding for the dairy. In breeding for beef, it is largely a question of form and quality.

MR. HUTCHISON: I move that a vote of thanks be returned to Prof. Shaw for his able and instructive address that he has given us this evening.

MR. HALL: Will the gentleman who made the motion accept the amendment, and make it a rising vote of thanks?

MR. HUTCHISON: Certainly.

The motion was duly seconded and agreed to by a standing vote.

On motion, the meeting adjourned until to-morrow morning at 9 o'clock.

Harrisburg, Pa., Thursday, 9 A. M., January 25, 1906.

At the designated hour the meeting was called to order by the Chairman, whereupon the following proceedings were had:

It was announced that the committee on specialists were not quite ready to report. Also that the report of the Executive Committee would be presented a little later.

The CHAIRMAN: The next number on our program is the Report of the Chemist, Dr. William Frear, of State College, Pa.

Dr. Frear read his report as follows:

REPORT OF THE CHEMIST.

BY Dr. WILLIAM FREAR, State College, Pa.

NOTES ON MOLASSES FEEDS.

Until recently, the waste products from the manufacture of human food, vegetable oils, etc., that have been offered for sale in the cattle food markets have been distinctly nitrogenous in composition. The principal exceptions were oat hulls, sold under the name "oat feed," cob-meal and cotton-seed hulls. These nitrogenous by-products were welcomed as a means by which we might conveniently and cheaply cause our winter feeds to resemble more closely in composition the pasture ration of spring and early summer. We are rapidly learning, however, that by the proper use of leguminous seeds and roughage, we may both improve our rotations and decrease our bills for protein purchased from the feed dealer.

An interesting tendency in the opposite direction is now manifest. Within the last fifteen years—indeed, much more recently in America—a series of factory wastes, low in protein but rich in highly

digestible, nitrogen-free extract—sugars and pentosans—has appeared upon the market; the molasses feeds.

The importance of molasses as an available factory waste may be appreciated upon considering the following facts: Spencer states that in 1898, Germany threw away 138,816 tons of molasses derived from the beet. Beet molasses is too black and bitter for table use, and, in spite of the large development of the manufacture of cattle foods and alcohol based upon it, there remains a very large unused surplus. The United States has a rapidly developing beet sugar industry. In 1900, we grew nearly 800,000 tons of beets from which 163,500,000 pounds of sugar and 3,500,000 gallons of molasses were made. Of this molasses but a small part found a market. The molasses produced from the sugar-cane is also to be considered in this connection. Owing to the improved methods by which the juice is made to yield a larger fraction than formerly of its sugar in a crystallized form, the molasses has been made less desirable for table use. There is, therefore, a large amount of inferior molasses that might be employed for cattle food. In 1899, from 2,000,000 tons of cane we made about 320,000,000 pounds of sugar, 2,500,000 gallons of syrup and 11,700,000 gallons of molasses. At the present time, the wholesale quotations for inferior centrifugal molasses on the New Orleans market is seven cents per gallon; the lowest grade, "black strap," probably costs from three to four cents per gallon.

A brief consideration of the origin of molasses may give us a better notion of its feeding value. In the manufacture of sugar from the beet, the washed root is chipped and extracted with warm water, thus affording the two products, beet-pulp and diffusion juice. The former contains the fiber, most of the pentosans, protein, wax, and the insoluble ash; the latter, the sugars, soluble nitrogenous constituents, acids, gums and ash. The juice is purified by boiling, skimming and filtering and is then evaporated to such degree that the sugar will separate by crystallization. From these crystals, the liquid molasses is removed by centrifugal action.

Cane molasses is produced in a very similar way, except that ordinarily the juice is separated from the cane by pressure, leaving as a solid residue, the crushed cane or "bagasse."

The chief differences in the two products are due to the original differences between the sugar-beet and the sugar-cane. The average composition of beet molasses, as stated by Kellner, and of cane molasses, as stated by Browne is as follows:

	Beet molasses. Per cent.	Cane molasses. Per cent.
Water,	22.50	23.06
Ash,	7.10	9.13
Organic substances:		
Cane sugar,	51.50	26.89
Dextrose,	[.20]	11.27
Levulose,		15.58
Albuminoids,78	.39
Amids,	9.50	2.49
Other organic solids,	8.42	8.19
	100.00	100.00

At four cents per gallon of 11.8 pounds, this would correspond to a cost per 100 pounds of dry matter, in black strap cane molasses, of 33 cents. In 1900, the market price of beet molasses in Europe was about one-half cent per pound, making the cost of dry substance about 64 cents per 100 pounds.

Certain special characteristics not clearly set forth in these analytical statements should be understood. With reference to the nitrogenous matters: Cotton-seed meal, linseed meal, gluten feed, wheat bran, and middlings, indeed all seed products, contain their nitrogen in albuminoid form, the form most highly valued for feeding purposes. In the molasses, on the other hand, only a small fraction of the total nitrogen is present in this state of combination, the major part being contained in the so-called "amid" substances. In this respect, the molasses resembles the root or cane from which it is derived, and shares the characteristics of pasture grass and all the more succulent foods. It is an interesting fact, that our domestic animals thrive especially well on these green foods, and yet, until very recently, the most careful experiments with the amid bodies, have failed to establish any value for them as nutrients. Since they are formed in the breaking down of albuminoids in the intestine and, in the plant, are intermediate products from which the albuminoids are built up, it has seemed strange that their nutrient value should appear so small. Within a year or two, however, evidence has begun to appear that our earlier experiments were at fault in their method. When an albuminoid is broken down, it always yields more than one kind of amid. The earlier experiments were, however, attempts to build up albuminoids from a single amid, and resulted negatively. Several experimenters have now tried to form albuminoids by starting with several amids, and appear to have succeeded. If their success should be fully confirmed, the valuation of succulent foods and also of the molasses feeds will be considerably increased. Berger found the nitrogenous matters of the sugar-beet molasses inferior, nevertheless, to protein, in rabbit feeding.

Both sugar-beet and the sugar-cane contain nitrates. The leaves of these plants are often quite richly supplied, and injury to stock has appeared because of the effects of the nitrates. Further, when the wastes from the manufacture of alcohol from beet molasses are dried and burned to recover the potash in them, violent explosions sometimes occur, owing to the nitrates present in these wastes. As saltpeter, the nitrate probably present, acts vigorously upon the kidneys, many have feared that the molasses might contain enough saltpeter to cause ill health in animals eating the article in considerable quantities. Many authorities state that about one-sixth of the nitrogen in beet molasses is present as nitrate. The results obtained by different analysis show wide variation in this respect; thus Pagnoul found in 120 samples of molasses an average of 1.31 per cent., while Kellner reports only 0.2 per cent. as present in average beet molasses. Browne states that about one-thirtieth of the nitrogen of cane molasses is present in the form of nitrates, equivalent to about .27 per cent. of saltpeter in the molasses. There is no evidence, however, that serious injury has resulted from the amount of nitrates present in the molasses used for cattle food.

In respect to the composition of the ash, molasses differs materially from seed products and also from leaves and stalks. In the

former, potassium and phosphoric acid are especially abundant, lime, however, being present in considerable amount; in the stalk and leaf, on the other hand, lime is the more conspicuous ash component. In the case of beet molasses, the quantity of potash varies from 50 to over 70 per cent. of the pure ash, common salt being next in importance; while there is very little lime and a especially small quantity of phosphoric acid present. The same statement applies with little modification to cane molasses, the amount of potash being somewhat less.

The nitrogen-free extract of molasses is distinctly more digestible than that of seeds, whose starch must be converted by the digestive processes into water-soluble substances before it can be taken up by the body. Of the nitrogen-free extract in beet molasses, all but one-eighth is composed of sugars, chiefly cane sugar. In the cane molasses, the true sugars form eight-ninths of the nitrogen-free extract, but over half of the sugars present are invert sugars. In each case, about eight per cent. of other organic solids is present, composed of gums, acids, etc., concerning whose feeding value we have no very definite knowledge.

For convenience, it may be well to remember that a gallon of heavy molasses weighs about 11.8 pounds.

Let us now consider the evidence with respect to the use of molasses as a cattle food. It has been quite largely fed in the liquid state in the regions where molasses is produced. For this purpose, it is commonly diluted with three or four volumes of water and served either as a drink or pouring upon cut straw or hay. In either way, the stickiness of the mixtures has been found objectionable. The animals have been hard to keep clean, and the molasses adhering to their bodies and to the mangers has attracted insects in a very annoying manner. Attention has, therefore, turned to the preparation of dry molasses feeds by the use of absorbent materials that take up the molasses and form with it a dry product convenient to handle and capable of easy transportation and preservation. A great variety of products of this character has been offered upon the market. Some of the absorbents have been highly nitrogenous feeding substances, such as cocoanut and palm-nut meals, dried blood, brewer's and distiller's grains, maize germ, wheat bran and dried curd prepared from skim milk. In other classes, absorbents composed more largely of carbohydrates are used, such as potato pulp, Marsden feed (prepared from the outer portion of the corn stalk), and also much superior substances such as sugar-cane bagasse and sugar-beet pulp. In the third class may be listed absorbents quite worthless as foods, such as turf or peat, cocoa shells, peanut hulls, coffee hulls, and chaff of various sorts. Respecting the turf, while it is admittedly an excellent absorbent, it must be stated that Kellner found it to lower the digestibility of the molasses, apparently because it carries away some undigested material so rapidly into the rectum that it escapes the attack of the digestive agents. Maercker has, however, commended it in the case of feed for swine, because it gives the manure a better consistence and prevents the development of the disagreeable odors commonly produced in such manure by the formation of butyric acid.

Beet pulp is one of the most important absorbents. Numerous trials in Europe as well as in Colorado, Utah and California, have

demonstrated its value for steers and sheep, about 24 pounds of the pulp being equivalent in effect to two pounds of mixed grain. Owing to its weight and consequent cost of transportation, the use of this material is confined to the immediate locality of the beet-sugar factories.

It has, however, been found practicable to dry this pulp for transportation, and since it is now offered on American markets in this condition, it deserves a passing word respecting its composition and feeding value. The pulp made by the Alma Sugar Company, of Michigan, has been found to contain:

	Per cent.
Water,	6.09
Ash,	5.64
Protein,	9.75
Fiber,	15.77
Nitrogen-free extract,	61.94
Ether extract,51
	<hr/> 100.00 <hr/>

The ether extract in this case is not fat, and the nitrogen-free extract is largely composed of pentosans. Digestion experiments made in Europe show that from 74 to 80 per cent. of the organic substance is digested, the digestibility of the protein being from 50 to 63 per cent. and that of the remaining constituents much higher. Schmoeger sums up the results of European experience in feeding the dried pulp as follows: The dried chips form as appetizing food useful for all domestic animals and are commonly eaten by them without reluctance. It is often thought best to moisten them with water a short time before feeding. This is especially true in the case of sheep which swallow the dried chips with such eagerness that they sometimes form balls in the digestive tract which swell and produce stoppage. The quantities that may normally be fed per head per day are for sheep, four-fifths of a pound; heifers, 2.2 pounds; milk cows, 6.6 pounds; draft oxen, 8.8 pounds; and oxen and cows on maintenance, 11 pounds. These quantities may in most cases be increased by 50 per cent. without injury. The feeding value may be roughly estimated from the fact that it takes eight pounds of the wet pulp to make a pound of the dry material.

The quantities of molasses taken up by various absorbents differ much from one another. The cocoanut and palm nut cakes, brewer's grain, etc., take up about 150 pounds of molasses for each 100 pounds of the absorbent, bran only 100 pounds. One hundred pounds of turf meal will absorb 300 pounds of molasses; dried beet pulp, 33 to 67 pounds of molasses; dried bagasse, 400 pounds of molasses. The molasses is usually heated above the boiling point of water so that it may be absorbed more readily, and in many cases, the moist beet pulp and bagasse are mixed with molasses, and the mixture subsequently kiln-dried.

The molasses feeds tend to ferment if they contain more than 20 per cent. of moisture, though turf molasses will bear 25 per cent. Browne reports that blood molasses becomes putrid in the moist

climate of Louisiana, so that it cannot satisfactorily be kept there. When the feeds become over moist, they ferment, part of the sugar is inverted, and there is a tendency to sourness and moldiness.

Much interesting study has been devoted to the nutritive value of molasses, either fed alone or when used in combination with the various absorbents above named. Time will permit only a brief summary of the work of the last fifteen years upon this subject. Some of the most conspicuously satisfactory results have been obtained with *horses and mules*. Numerous observers report it to be appetizing and to keep the animal in sleek, vigorous condition. Welborn states that the 400 pound Filipino pony compares favorably in endurance with the Texas mustang, yet receives only a little "dulce," or diluted molasses, and grass, with an occasional ration of rough rice. Griffin maintained hardworked army horses in Porto Rico on 13 to 15 pounds of molasses and 35 pounds of grass per day per 1,000 pounds live-weight; their condition improved. The New York *Sun* reports that the heavy teams (1,700 or 1,800 pounds) of a Brooklyn sugar-refining company were kept in prime condition at hard work on a ration of one and one-half quarts of cornmeal, one quart of wheat bran, several pounds of cut hay and one and one-fourth quarts of refinery syrup in the morning; four to five quarts of oats at noon; and a repetition in the evening of the morning ration with an addition of five pounds of loose hay. The cost of this ration was 34 cents per day, *vs.* 42 to 44 cents for oats and hay alone. Animals in run-down condition quickly regained weight. Grandeau, from his observations on Paris cab horses, reports that heavily worked horses, when fed with a mixture of straw and beet molasses in amounts equal to 5½ to 8 pounds of molasses per day, all gained weight; that the total ration cost but 28 cents per day, instead of 44 cents for the usual grain ration. Berns, experimenting with growing horses, heavy truck animals and driving horses, found that all improved when one quart of beet molasses diluted with three quarts of water and mixed with five pounds of cut hay were used; that one quart of molasses at 3 cents replaced three to four quarts of good oats costing 4.5 to 6 cents, and resulted in a total reduction of food cost of 25 to 33 per cent.

Dr. Dalrymple, Veterinarian of the Louisiana Experiment Station, recently reported the results of an investigation into the Louisiana plantation practice. Reports from 42 plantations showed that 2 to 21 pounds of black strap molasses was fed per day per head; average, 9.5 pounds. The saving in cost is estimated variously at 10 to 60 per cent., in comparison with the cost of the usual grain ration; in particular instances, a saving of 15 to 21 cents per day is reported. One plantation keeping 177 mules estimates a saving of \$6,000.00 in one year from molasses feeding. Digestive disturbances, colic in particular, were greatly diminished, as other observers have noted. The cane molasses is somewhat constipating, but a little bran readily corrects this tendency. When mixed with whole grain, it leads to imperfect mastication; therefore chop should be used with it. No injury to the animal's teeth is shown to occur.

For *fattening steers*, Kellner concludes from his experiments, that the organic matter of molasses is as valuable as starch. Dickson and Malpeaux found that an addition of one and one-half pounds of molasses caused in 20 days a net gain of 10 pounds weight on 2-year

old steers. Maercker especially commends molasses feeds for these animals, and states that three to four pounds per day can advantageously be used.

For *sheep*, Maercker recommends eight pounds of molasses feed per 1,000 pounds live-weight; Stein, 10 to 14 pounds. Ramm reports feeding eight pounds of beet molasses or 10 pounds of peat molasses feed per 1,000 pounds live-weight, without injury. He reports a comparison of barley meal, molasses and peat-molasses feed, added to a basal ration in such quantities as to furnish equal amounts of nitrogen-free extract. The gain in live-weight on the barley ration being taken as 100, that on molasses was 82, on peat-molasses feed, 72; that of wool: barley 100, molasses 73, peat molasses 56. In the carcass, the barley ration produced more muscular tissue and fat; the molasses, more dry matter and ash; the melting point of the fat was lower in molasses-fed sheep than in those given barley; the profit, greatest from the molasses ration.

Albert and Linfield severally report experiments with *fattening lambs*, and state that beet molasses and molasses feeds are rational feeds for these animals. The former states that molasses is not so good alone as when mixed with grain, and that a large increase of the nitrogen-free extract in the ration is not profitable. Linfield obtained 14 cents more per head for grain-finished lambs than for those molasses-fed. C. Gerland also reports excellent results, the addition of 9 pounds of molasses to the ration per 1,000 pounds live-weight, caused a gain of 37 pounds live-weight in 10 days.

For *fattening swine*, Friis compared a molasses feed (one-eighth palm-nut meal, three-eighths wheat bran, four-eighths beet molasses) with barley and maize and considered it of nearly equal value. When maize was used alone in comparison, molasses gave a smaller, but cheaper gain. The fat produced by pigs on the molasses ration was intermediate in firmness between that produced by the maize and barley rations respectively. Blood molasses was, however, quite inferior; the pork was poor, the fat soft; so that the carcass was worth 1 to 2.7 cents less per pound on the English market, than that from grain-fed hogs.

Lilienthal reports a like result with blood molasses. Faye and Fredericksen found molasses nearly equal in nutritive value to barley for 50-pound pigs, and cheaper; from repeated experiments, a lower value, about three-fourths that of grain, was assigned; the gain in weight was less per day and per pound of food consumed. The fat was firm, however, and the meat excellent.

Gerlach, and Dickson and Malpeaux report a very rapid gain from the use of molasses feeds. Klein regards molasses as worth about four-fifths as much as mixed barley and maize.

Lehman states that bad results have attended the use of beet molasses with sour milk.

In a single instance only is serious injury reported. Branté states that three pigs, seven to nine months old, sickened and died after three weeks' feeding upon a palm-nut-bran molasses feed. He supposes the cause to have been the injurious influence of the potash salts in the molasses.

Experiments with *cows* have led to somewhat contradictory results. It is recognized that somewhat more care is needed in using molasses with these animals than with other domestic stock. Es-

pecially is this considered desirable in the case of cows with calf. Maercker recommends the use of $2\frac{1}{2}$ pounds per 1,000 pounds live-weight. Wahlquist states, however, that he has fed as much as 9 pounds of beet molasses without apparent injury; Hoppe, 11 pounds; and Ramm, 17.6 pounds to cow with calf, with no ill effect; while Bäcker states that 9 pounds of palm-nut molasses feed containing almost equal parts of palm-nut and beet molasses, caused severe scouring. Not all cows eat molasses or molasses feed with relish. It is needful in most cases to introduce it gradually. Respecting the influence on the flavor of milk and butter, no unfavorable results have been found. A number of experimenters report that these feeds caused no increase in flow, but an increase in the richness of the milk; others report the opposite effect.

As to profit, Weigmann states that during one month turf molasses was found equal in nutritive effects to wheat bran. Ramm found cocoa-hull molasses deficient in nitrogen, causing a decrease in milk flow; even when protein was added, the live-weight fell off. Potato-pulp molasses feed was not eaten at all readily; indeed, molasses alone was more completely consumed than when mixed with other feeds. None of these feeds equaled barley meal in nutritive effect.

The Alnarp College, Sweden, reports that two and three-fourth pounds of molasses produced a better milk flow than two and one-fifth pounds of oats and barley, but less gain in live-weight. B. Schulze reports that maize-germ molasses feed gave about the same results as field beets and wheat bran. Ramm replaced 11 pounds of peanut cake by an equal weight of maize-germ molasses without decrease in the milk yield.

The cases of sickness following the use of molasses feeds are more numerous for cows than for other classes of farm stock.

A number of experimenters have endeavored to determine the respective nutritive values of the different molasses constituents. Ramm compared molasses, sugar, and sugar to which the ash of molasses had been added; the milk flow decreased rapidly when the latter were substituted for molasses in the ration; but sugar plus molasses distillery-wastes was found equal to molasses; whence he concludes that the organic non-sugars of the molasses are of considerable nutritive importance. The feeding of sugar instead of molasses did not seriously diminish the total milk flow, but did injuriously affect the fat percentage.

Kellner, in his experiment on steers, found the organic matter of molasses equal to starch in maintenance and fattening effects, and 25 to 30 per cent. superior to sugar in the latter respect.

Meissl found molasses even superior to the starch of barley in maintaining swine, and far better than sugar. He inclines to attribute this to the influence of the non-albuminoid nitrogenous substances present, although there is no direct proof favoring them rather than the other non-nitrogenous substances other than sugar.

The interesting observations of Nicolas may be added: That in experiments where the substitution of molasses for concentrated feeds had caused a diminished milk flow, and fat richness, the addition of phosphoric acid, in which molasses is deficient, to the ration, was followed by a return of normal milk flow and quality.

In conclusion, it may be well to add a word of caution. The ingredients of the molasses feeds are so difficult to distinguish, so many

worthless materials have been used in their manufacture, so many viable weed seeds have been found in them, that the purchaser should be more than ordinarily cautious in his inspection, and require guaranties with respect to more points than the percentage of protein and fat. When well made, normally sold and judiciously used, they bid fair to be an excellent addition to the dietary list, especially for our horses and fattening stock.

The CHAIRMAN: Questions are now in order.

MR. CLARK: Mr. Chairman, I would like to ask Dr. Frear how it would do to buy the molasses and mix it with our chopped feed.

DR. FREAR: You can do that, but unless you mix it at a rather high temperature, you get a sticky mixture. They make machines especially for that purpose; they are sold more largely in Europe, however, than they are in America.

MR. HUTCHISON: Mr. Chairman, I would just like to give a little experience along that line, a thing that I came across; it relates to this molasses feed. In the city of York there is a gentleman who is selling quite a good deal. He sold four carloads last winter, three of the carloads sold gave good satisfaction, but the fourth was sold on towards Spring, and it became so packed and musty that the animals wouldn't eat it, and that condemned what he sold before. There is no doubt that the feeders there buying the goods were very much pleased with it and had good results. If you get it good and feed it fresh you get good results. I came across some men using it for feeding mules. One man in Columbia, who mixed it with his oats and obtained good results. The trouble is to get the goods fresh that you buy. It will become compact and sour in the sacks, otherwise, and difficult to get out.

DR. FREAR: It is found in Europe that if these feeds have more than 20 per cent. of moisture they will get musty and sour, and the cane sugar in them will be changed and become practically unfit for use, so they have fixed that at a maximum standard. It is necessary to keep these feeds in a dry place, as they absorb moisture readily, and when they have an excess of moisture, they are unfit for use.

PROF. COOK: Good results have been obtained in this country by mixing with cotton-seed meal and in that way increasing the nitrogenous material, and I think with a good law one would be safe to buy the feed.

DR. FREAR: If you are sure that the feed has been examined and tested, I think you are safe, but as I tried to indicate a moment ago, I should never buy a new feed until I knew it had been tested and knew about what it was.

PROF. SHAW: I would like to asked Dr. Frear if he would recommend molasses to any kind of breeding stock.

DR. FREAR: I should say no, for the special reasons I mentioned a little bit ago, with reference to the ill effects of some of the constituents, the possible ill effects. While it has been done a good many times without serious injury, I think the precaution would apply

to the females of their species. I would say that toward the latter part of pregnancy it would not be advisable; in the early part, it might not be so objectionable.

PROF. SHAW: Would you recommend feeding in any considerable quantity, molasses to young animals that are being grown for breeders?

DR. FREAR: Not unless the nitrogenous material is well kept up where it has been given—where the ration has been given with that precaution, a great many excellent results are reported with young and growing animals.

PROF. SHAW: Would you prefer any other kind of food if you had your choice to feed to that kind of an animal, and if so, what would you adopt?

DR. FREAR: Good pasture grass.

It was moved and seconded that Dr. Frear's paper be received and placed on file and published in the bulletin. Agreed to.

The SECRETARY: In the preparation of the program, we had in mind the thought as to time. One year ago there was a resolution passed that all reports of the Specialists and Standing Committees should be in writing and that fifteen minutes should be occupied in their reading. We will have to be very careful or we will find that we will not get through and we will not have time for questions and discussions.

The CHAIRMAN: The next number on our program is the report of the Mineralogist, Col. H. C. Demming, of Harrisburg, Pa.

The report of the Mineralogist was read as follows:

REPORT OF THE MINERALOGIST.

BY COLONEL H. C. DEMMING, Harrisburg, Pa.

The past year has been a momentous one in the mineralogy of Pennsylvania. More minerals have been mined and sold than ever before in the history of the State. The leading resources have been our coals, oils, natural gas, iron ores, limestones, slates, cement rocks, silicates and clays. We also have mines of asbestos, barite, beauzitic clays, bromine salt, corundum, copper, chromite, emery, flint, fluor-spar, fire-clay, Fuller's earth, galena, garnet, gold, granite, graphite, ganister rock, infusorial earth, kaolinite, melanterite, manganese, malachite, magnesia, mica, moulders' sand, nickel, pyrite, peat, quartz and quartz crystal, sandstone, silver, sepiolite, salt, serpentine, shales for brick, strontium ores, umber and zinc. In addition, mineral waters are being produced and sold in unusually large quantities, including chalybeate, lithia and sulphur waters.

The asbestos deposits of southern Lancaster county are mined in-

termittently, and it is to be regretted that no more capital has been enlisted, as the outlook for a profitable industry near White Rock is very good.

The barite deposits of Blair, Clearfield, Franklin, Fulton and Huntingdon counties now and then produce a few tons of rock, and the work ceases for a time. As high a grade of barite as is found anywhere in America occurs near Mont Alto, Franklin county.

The demand for bromine from the salt of our salt wells has increased, and a grade that three years ago brought 20 cents a pound now brings 45 cents. For some reason the industry is encouraged more in Michigan than in our own Commonwealth, and consequently it is lagging here. It could be produced profitably in 38 of our counties, but Allegheny county seems to be the chief point of manufacture or extraction from the crude salt.

During the past year some fine pieces of beryl have been found in a quartz rock locality of northern Chester county. From beryl is extracted beryllium or glucinium, the oxide of which now brings about \$4,000 a pound in European markets. There will be an industry in this field in Pennsylvania this year.

We have much clay in Pennsylvania yielding large percentages of alumina, and nearly free from titanitic acid, especially in Clearfield, Clinton and Lycoming counties. Some of this clay will probably be shipped to Niagara Falls during the present year to be used in the manufacture of aluminum.

Large bodies of corundum were mined in northeastern Berks county, and western Lehigh county, during 1905. Mineral of this character has also been taken from one or two deposits in Chester county. The Lehigh article is of very good quality, as the sample shown here to-day testifies. This mineral is used for corundum wheels, corundum paper, and for other abrasive purposes. In India the finest sapphires and rubies come from corundum beds. Within the past five years very beautiful sapphires have been mined in Montana, and equally beautiful rubies in McDowell and Madison counties, North Carolina; but none thus far in Pennsylvania, except a few perfectly white sapphires in Delaware county, near Chester.

A new industry has been successfully launched by the dredging of the Susquehanna and Schuylkill river beds for coal, carried down from the culm banks of the principal mines of the anthracite. To such an extent has this work been carried on that during last year more than 80,000 tons were taken from the two rivers. The method of pumping up the coal and sand, and the separation of the former from the latter, is quite ingenious and interesting; and the product is very profitably marketed. Plans are now maturing for the briquetting of this fine coal, when the industry will become more firmly established. In Harrisburg and vicinity more than 10,000 tons of the so-called river coal are consumed annually.

Probably the most notable advance in coal mining in this State is taking place in Somerset county. The coal from some of the mines of that county is almost equal to anthracite, a sample from the Boswell mine yielding as follows: Moisture, 0.92 per cent.; volatile matter, 15.26 per cent.; fixed carbon, 79.50 per cent.; ash, 4.32 per cent.; and sulphur, 0.68 per cent. Three years ago Boswell was without a single inhabitant. A census taken at this time would show a

population of at least 2,000 souls. This fact is given as a proof that all of the most rapid growth of population does not take place in the West; and also as encouragement to farmers to remain on the farm; for, with every new industry, mine or manufactory, there is an added source of consumption of agricultural supplies, with a probability of higher prices than heretofore given.

The numerous clay deposits of Pennsylvania are being investigated and developed with more interest and commercial success than heretofore. It is almost certain that a Vermont corporation engaged in the manufacture of fire-brick for stoves and furnaces will have a branch established in Susquehanna county on account of some very desirable clays having recently been found in that part of the State. It is believed they will employ over 400 men.

More effort has lately been given to the mining of copper, owing to the high prices for the metal, than for many years. This commodity has been found in supposable paying quantities in the counties of Adams, Bedford, Lancaster, Lebanon, Montgomery and York during the past twelve months, and considerable capital has been enlisted.

Chromite is found in southern Lancaster county in such quantities that a few carloads are sold every year. Efforts are now being made to increase the output. Chrome yellow, and chrome steel for safes are made from this ore.

Emery of fair quality was mined last year in Berks and Lehigh counties.

The flint industry is holding its own in Adams, Chester and Lancaster counties. It may be amusing, if nothing more, to know that fully 30,000 flints are shipped from this country every year for old fashioned flint-lock guns in Asia and Africa, and for striking fire. Most of our flint, however, is used for flint glass, porcelain ware, and similar articles.

The best fluorspar deposit thus far found in Pennsylvania is located in Fulton county, near Fort Littleton. Little has been taken out and sold, because of the larger deposits in Southern Illinois; but the time is not far off when the demand will warrant the steady working of the fluorite quarry in northern Fulton.

The galena deposits of Huntingdon county are attracting renewed attention, and on account of the high prices of lead there is a strong likelihood of work in that line in Columbia, Huntingdon and Northumberland counties this year; possibly in Snyder county also.

The ganister rock industry is very prosperously carried on in Blair, Huntingdon and Mifflin counties, and one firm is shipping a thousand tons a month of this rock to Buffalo, N. Y. It is selling at an absurdly low price, about 60 cents a ton on board cars. It is used for furnace linings and silica brick. Our Commonwealth has more silica brick manufactories in profitable operation than any other state in the Union, and the trade is increasing.

Gold has now been found in 27 counties of the State; but seemingly the ores are all too low grade to lead to investment of much capital.

The mining of graphite is now being carried on very successfully near Chester Springs, Chester county, some of the natural product yielding as much as 90 per cent. pure graphite. There is a fine market for this material, pulverized, at from \$50 to \$150 per ton.

There is more inquiry for Pennsylvania iron ores than for many years. This is due in part to the enlargement of a number of plants, and the erection of new plants, for the manufacture of steel by the basic process, or open hearth furnace.

A fine sample of infusorial earth has been received from near Wellsboro, Tioga county, the owner stating that he has many thousands of tons of it. An analysis has not been made, but the appearance of the mineral indicates that it would be worth at least \$20 per ton, pulverized, and this in carload quantities.

The volume of kaolinites from southern Cumberland county continues to increase. It is much sought for in the manufacture of paper, and especially wall-paper.

So great has been the increase of our limestone traffic that one railroad company of this Commonwealth has hauled from various quarries from 100 to 300 carloads in a single day. New quarries are being opened in a dozen counties, the demand being for both calcium carbonate and magnesium carbon varieties. It is now quite clear that this State produces more than 30 kinds of limestone, some of it crystallized into pure marble.

One of the most notable minerals found within our borders is melanterite, or natural copperas, the body being near Olivet, in Armstrong county. Properly developed, and with sufficient capital, this deposit ought to give employment to more than 100 men at fair wages.

Forty years ago nearly all the nickel used in the United States, including that for coinage, came from the nickel mines of Lancaster county. While the ores are not exhausted, for some reason they are not worked regularly, and competition is now keen on account of Canadian nickel.

The known natural gas area of the State is extended as far east as Wyoming county. There was some excitement on this account at Skinner's Eddy eight months ago; but the well diggers ceased operations before sinking to a proper depth. Small quantities of natural gas have now been found east of the Allegheny Mountains in Berks, Clinton, Dauphin, Juniata, Lycoming, Mifflin and Wayne counties; but in every instance the exploitation was not completed owing sometimes to lack of capital, and at other times to the lack of knowledge or experience on the part of locators.

There is a good opening in southern Snyder county of pyrite, for sulphuric acid manufacture. Most of this mineral now comes from Spain, or our Southern states.

Petroleum is not as plentifully produced in our State as in former years; the known fields having been pretty thoroughly gone over, and most of the oil pumped out.

Attention is now being paid to peat deposits everywhere in the United States east of the Mississippi river, and investigation is now going on in Pennsylvania; but more will be said on this subject in my annual report as Geologist of the Board. The same is also true of quartz and quartz rock.

Shales for brick manufacture are more and more utilized every year. It may be remembered by some of the members of the Board that attention was called to the practicability of shales for brick by your Mineralogist long before a single plant had been put in operation. There are now dozens of such plants from Monroe county to

Butler, and from Bradford county on the north, to Delaware county on the south. Attention was also called before this Board to the cultivation of nitrogenous bacteria; to electrical influence in stimulating the growth of crops; to the vast water-power of the Susquehanna for electrical generation, and to the cadmium nitrate insecticide, all of which are now being practically applied, in two instances, the United States Government acting upon the suggestions set forth in our reports of years ago.

Among the latest mineral discoveries of importance, are very large beds of peat in a number of our counties, especially in Dauphin, Erie, Franklin and Lawrence; also of zinc ores in Franklin and Fulton counties. From some ores of Fulton county that had been melted down in a blacksmith shop, the "button" thus made gave 97 per cent. pure zinc.

Some seem to have the impression that Pennsylvania has been quite thoroughly developed in a mineral way, but the work is little more than fairly begun. Every year something new and valuable will be found, until we more fully understand why our Creator made these lofty, rugged mountains, and beautiful, fertile valleys.

This was followed by the Report of the Geologists.

Col. H. C. Demming read his report as follows:

REPORT OF THE GEOLOGIST. NO. 1.

BY COLONEL H. C. DEMMING, Harrisburg, Pa.

QUARTZ ROCK.

In one of the counties of this State there is a farm which has been under cultivation more than 100 years. For 14 years the owner had much difficulty in making ends meet on account of its products. Last July one of his men found and brought to him a piece of whitish rock. It lay on the farm owner's table for weeks, with little or no attention paid to it. A visitor dropped in, saw the whitish-colored rock, picked it up, and examined it. Then he said to the owner, "Have you much of this?" The reply of the owner was that he did not know. Said the visitor, "Why don't you have your farm examined by an expert? This rock may prove to be of value." "Who can make the examination?" A name was mentioned. "Why," says the owner, "I have known that man for more than 20 years, and I never thought of him in this connection." The man was sent for. An examination of the rock deposit was made; samples were analyzed. Then it appeared that the rock was quartz and quartz crystal, and the total rock body more than 250,000,000 tons. The analyses showed that it all yielded more than 99 per cent. silica, a select piece 99.84 per cent. pure. More than a thousand tons were quarried, and within three months thereafter the owner had inquiries and orders for the mineral to the extent of above 200,000 tons, and at a profit of about \$2 per ton, making him substantially a mil-

lionaire with so much additional rock in reserve. So desirable is the rock for porcelain, cement, white mortar, concrete and filtration purposes that there is a demand for it both in this country and in Europe. Numbers of men are now at work quarrying it, and soon there will be plants erected for pulverization. It may be that within a year between 200 and 300 men will be regularly employed for mining and preparing this extraordinary material for market. I take pleasure in submitting to you average samples of the rock from a farm of Pennsylvania, considered six months ago about one of the poorest farms of the State, and now perhaps the richest.

POTASH.

A careful study of the areal and economic geology of Pennsylvania has led to the conclusion that potash exists in largest quantities in soils at the base of timber-covered hills and mountains where there has been an annual washing down and settling at the base of the decaying and decayed material from above. Decomposed leaves and wood of trees, and the remains of vegetable growth, all are unusually rich in potash, and an accumulation of these constituents supplies the soil with a comparatively large percentage of that element (potassium) so necessary to some species of plant life, especially potatoes.

PEAT.

Some of our sister states have taken up the subject of peat for fuel with decided vigor. Conspicuous in the list are Massachusetts, Michigan, New York and Wisconsin. In the Dominion of Canada peat is commanding the attention of men of large capital. Large peat beds are now known to exist in Butler, Dauphin, Erie, Franklin, Lackawanna, Lawrence and other counties of our Commonwealth. As has been wisely said by Dr. L. A. Stillings, in the November number of the "Electrochemical and Metallurgical Industry," the great value of peat fuel is unknown to the average person in the United States. We do not yet appreciate the vast resources offered all over the country for a cheap, clean fuel. When we find that the United States has more than 100 times the acreage of peat to that of all Europe, and that Europe has been to a great extent dependent upon peat as a fuel for many years, and, at that, only used up a small portion of its peat bogs, we can see the immense future of such a fuel in this country, either in connection with steam or gas power plants.

The cost of fuel is governed by its heat and waste. The use of both coal and wood is very wasteful, only a comparatively small part of the heat units being utilized. With coal the clinkers, with wood the live embers which drop through the grate, are an additional source of loss. When briquetted peat is first placed on the grate it burns with a short, blue flame, which gradually becomes a yellowish glow. It emits an intense heat, which is easily controlled by draughts. A peat fire will burn until exhausted, and is nearly smokeless and ashless. The smoke of peat, unlike other fuels, is good for the lungs, and serves as an excellent deodorizer.

The approximate percentage composition of peat is: 16.4 per cent. water; 41.0 per cent. carbon; 4.32 per cent. hydrogen; 23.08 per cent.

oxygen; 2.06 per cent. nitrogen; 11.09 per cent. ash constituent, with a specific gravity of 1.05. Sulphur is almost never found. The ash constituent will vary from a small fraction of one per cent. up to 15 per cent., the average of the peats of the United States being 3.07 per cent., while that of the German peats is 7.9 per cent. The poorest sample of peat which has been analyzed in my laboratory gave the following constituents and percentages: Moisture, 10.64 per cent.; nitrogen (2.03 per cent. ammonia), 2.46 per cent.; sulphur, 0.80 per cent.; volatile combustible matter, 40.99 per cent.; fixed carbon, 17.53 per cent.; ash, 27.58 per cent. Total, 100.00 per cent. It will be observed that the ash yield was unusually high, but this was due to the sample having been taken from a part of the peat bog where the sand sediment from an emptying stream had settled. That same bog, in other parts, ought to produce a peat with less than 3 per cent. ash.

Peat is known in general as the rich, dark brown mud found in marsh and swamp lands. However, one should not forget that all rich earth in which plant life grows readily is a form of peat, and will be easily burned after carefully dried.

In the old world peats are mostly composed of decayed mosses and grasses. In this country we have several kinds of peat. The main one, however, is like the European peats, and is composed of decayed sphagnaceæ. On the Atlantic coast there is a variety of so-called "salt march," which produces a peat which would not be of any use for our purposes for fuel; but I have not found any salt march peat in Pennsylvania.

The peat mosses that make up our best Pennsylvania peat are found almost entirely decayed, as a rule, though parts of the peat deposits of Erie county seem to have remained, in some instances, nearly as perfect as they would be expected to appear after one or two years' cessation of growth. Before death occurs sphagnaceæ may be seen growing in more or less compact tufts or patches on the surface of some of our bogs, or floating in stagnant water, and some are on the borders of mountain rivulets. They are soft and flaccid caulescent plants, generally of large size. They are whitish, yellowish, or sometimes red or olive-colored, and are perennial. The branches are generally spreading, in lateral fascicles of from two to seven, rarely more, those at the summit of the stem capitate. The leaves are nerveless, translucent, formed of a single layer of two kinds of cells. In the Erie county peat bogs there has been so little decay in some instances that the lateral fascicles are still on the stems. There are about twenty-five North American species, and many varieties or forms; but this general description will answer for all practical purposes in our State, when any suspected peat bog has been located.

The Dismal Swamp of Virginia is one vast peat bog. We have not a single deposit in Pennsylvania one-fourth its size, although in Lawrence county there are many acres of land underlaid with good peat. Almost all of New England is one mammoth peat bog, which are coal measures in the primary process of formation. All coal has been mud, and, hence, many kinds of mud can now be converted into a substitute for coal.

Peat is best adapted for fuel after the water has been pressed out, and the material briquetted into proper sizes for use. In bri-

quetting almost any other substance, a binder has to be supplied; but in peat there is a substance called "pentosane," which serves as a natural binder under compression.

The cost of producing peat-fuel is very low. There is not a section of Pennsylvania where it cannot be made ready for market at an expense of less than \$2 per ton. There are plants in operation in the United States and Canada where briquettes are made by artificial drying and compressing of powdered peat at a cost of about \$1.30 per ton. Such plants have a capacity of 50 tons per ten hours, and their original cost is about \$60,000.

Peat has other uses than for fuel. When dried the upper layer serves as a bedding for horses and cattle in some parts of Europe, and in the same parts of the old country it is powdered and mixed with molasses and fed to cattle; but it is very doubtful as to beneficial results. The dark colored peat of the lower layers, mixed with barnyard manure, makes an excellent fertilizer. By the Ziegler system of briquetting, about ten pounds of acetate of lime are made from every ton of raw peat. Alcohol can be made from it by direct distillation, the process being similar to that of wood spirit. Properly ground and pulverized it makes a very desirable brown color for dyeing, which neither the sun nor atmosphere will bleach or decompose. Peat is a non-conductor, and, therefore, is valuable in the lining of ice houses, and for covering of pipes, and in partition walls. Good and cheap white paper is now made from bleached peat; and that which is most fibrous is found to be an excellent material for manufacturing pasteboard and felt. At Hamburg, Germany, artificial stone is made from peat for street pavements, in lieu of asphalt; and in that city there is a firm which produces leather from it for the soles of shoes. In the coking of peat, by one process, 90 pounds of tar are produced from every ton of raw material. Powdered peat is a cheap, effective and odorless disinfectant for rooms, closets and stables. It exhausts by sucking nine times its own weight, and its use in Europe is becoming more popular every year to effect a healthy and refreshing air in buildings. For preventing epidemic diseases it is spread in hospitals, the sick room and slaughter houses.

For country people a small \$400 plant for compressing cold peat will be found to answer almost every purpose. These presses are on sale in New York City, where there is an experimental plant for determining the heating quality of peat from any place, and where they have facilities for measuring the depth and volume of peat bogs, and for pressing the product. With our peat beds developed in every part of Pennsylvania, we will have an abundant supply of cheap fuel. So long as all goes well at our coal mines, and we have our timber lots, we think that other sources of fuel supply are quite unimportant. But within the year you will have practical illustrations in some parts of our Commonwealth of the better fuel in the form of peat briquettes. Thus we are gradually reaching a more comfortable condition in home life, with tenfold more opportunities and blessings than had our forefathers, and with tenfold more reason for gratitude and praise to Him "who giveth us all things to enjoy."

Mr. W. H. Stout, of Pinegrove, one of the Geologists of the Board, read his report, which is as follows:

REPORT OF THE GEOLOGIST. NO. 2.

 BY W. H. STOUT, Pinegrove, Pa.

The subject of Geology has received but little attention in its relation to agriculture, being principally confined to investigations relating to minerals and metals. Recently the United States Department of Agriculture commenced a soil survey which may lead to valuable results in designating the various formations and their adaptability to different crops, besides giving more prominence to a much neglected study. The true basis of agriculture, the soil, being of first importance, of which Agricultural Geology deserves fully as much consideration as any of the sciences relating to art.

Also from a hygienic point the subject merits careful study, and the longer a community has occupied a locality the more are the dangers from contamination increased from surroundings, saturated with the waste and decay, finding its way into the water supply, resulting in disease. This fact emphasizes the necessity for a better knowledge of the trend and dip of the rock formation wherever wells and springs are used for household purposes.

This State contains a great variety of soils, from the Azoic or primary system up, embracing Alluvian and drift. The mountains in the State have a N. E.-S. W. course, and in traveling in any of the numerous valleys, the same formations continue long distances and practically contain the same characteristics; but in passing from the southern border to the line of New York the numerous formations are passed over with the rocks found at all angles to a horizontal position.

The classification adopted by the most distinguished Geologists are various and confusing to the layman or non-scientist. They give us the Paleontological, the United States system of Rogers; New York State; Ansted; Lyell; Mantel and Buckland; Dana and others. Those who read the Pennsylvania Geological reports have the same as adopted by New York State and are perhaps the most familiar to us.

Starting from the Delaware River and crossing Delaware county, we would have the alluvial or river mud, gravel and clay, trap, serpentine, Chestnut Hill schists, mica scists and gniess; South Valley hill slate and the Laurentian Syenite and granite.

Next north comes Montgomery with much the same, and additional, the new red or Triassic and Limestone. Entering Lehigh we find, in addition, the Potsdam sandstone; Hudson river slate; Utica shale with Medina and Oneida of the Blue ridge, also the shaly limestone used in making cement.

Crossing to Carbon, the entire Devonian and Carboniferous systems occur, divided into the Clinton red shale; lower Helderburg Lime, Oriskany sandstone; Marcellus black shale; Hamilton, Genes-

see, Chemung, Catskill, Pocono sandstone, Mauch Chunk red shale, Pottsville conglomerate and the coal formation, besides the drift in places.

Lackawanna is a continuation of the same as Carben and Susquehanna, largely so excepting that much of the territory in these counties is drift-covered, and the rocks remaining almost horizontal over most of the sections outside of the coal measures and consist principally of the Catskill group, so that uneven and rolling, the northern tier and the glaciated district are more uniform over larger area than where the rock is tilted and the various strata appear near the surface and close together.

These characteristics cover much or all the surface of the State excepting in the bituminous coal districts where the mountain limestone occurs, which does not appear east of the Susquehanna River, but appears to have the Pottsville red in place of the limestone.

The principal distinctions between the various soils may be the Alluvian, the limestone, the old and new red, much alike in value, the shales, the traps, and the drift being more varied.

The coal measures, where the conglomerate and Pocono sandstone prevail, the soil is very poor generally and is said by Prof. Johnston, "to drink up all the water and eat up all the manure."

Some of the Oriskany sandstone and the Hamilton shale appears better adapted for road material than for agriculture, and also of the drift when composed of too much coarse material, gravel and stone.

The Delaware River gravel, where the finer sediment was deposited from the glaciated territory, contains some of the very best soil. The mica schists also, the limestone valleys are among the most desirable.

The clays vary greatly in productiveness, where drainage is good, naturally or artificially, with proper treatment, can be made to produce good crops of wheat, oats and timothy and sometimes fine corn during dry seasons.

The lake country, formed and shaped by glacial agencies back of the terminal moraine, is usually much more productive and adapted to cultivation than in the immediate vicinity south of the moraine where the mountains are more abrupt and the valleys narrow. It may be said that the mountains were removed to a great extent through glacial action, streams dammed up and watercourses changed in opposite directions from their former currents and all the lakes originated under the influence of moving ice, irresistably moving onward to an isothermal line where warmth checked its forward movement. Afterwards, probably climatic changes caused a recession of the ice field, moving back to where what exists of it to its present latitude near the Polar region. Agriculturally the soils from the various formations differ much, while some general principles apply to their treatment. Some of them are more retentive of moisture and fertility than others and have inherent elements which, through the agency of heat, moisture and carbonic acid, disintegrate readily and yield fresh supplies to successive crops, requiring less artificially supplied plant food than those of other origin.

The subject is one which could be continued almost indefinitely from different aspects and is worthy of more care than usually exercised by the farmers whose labors are almost daily directed to ob-

taining best returns from such soils as they possess and too frequently by misdirected efforts endeavor to obtain something from nothing.

Notwithstanding the great quantities of insoluble plant food in most soils, it is of little use to the present day farmer, and a misleading theory in science because available to the chemist with strong acids and intense heat. Vegetation possesses only to a very slight extent the power to obtain what is required from insoluble constituents present in the soil.

The soil which engages our attention as farmers is composed of an admixture of minerals, decayed vegetable matter, together with the remains of animal creation, in the surface soil of sand and clay in various proportions, during long periods of time when oceans swept over the present surface and again exposed to the elements, fitted conditions for plant and animal life.

That the amount of animal matter incorporated in time must be considerable, yielding phosphoric acid by perished animals on land and in seas, with that of prehistoric races which may have existed in the past, being again restored to the elements from which they were derived. That long, wiggling slender creature usually considered useful as bait for fishes and food for birds, has and continues to perform a great feat in digesting vegetable matter in our soils, besides adding its own remains, after working over tons of material in the ground, and it is well known that a soil abounding in angle worms is a sure indication of fertile ground.

On motion, duly seconded, the Report of the Mineralogist was received and filed.

On motion, duly seconded, the reports of Col. H. C. Denning and Mr. W. H. Stout, Geologists, were received and filed.

Mr. Sexton, Chairman of the Committee appointed to call on the Governor, reported that the Committee had performed its duty, and that the Governor could not be present until this afternoon at half-past four.

Dr. Tower presented the Report of the Executive Committee which was accepted. (See page 8.)

The SECRETARY: Mr. Chairman, we have with us Mr. Cook, of New York, and I would suggest that he take the next period. I do not think a motion is necessary; if there is no objection, you might announce that that would be the order. We do not mean by this to cut out any of those other reports; they can come in a little later, we hope.

The following subject was discussed by Mr. Cook:

BARN CONSTRUCTION AND SANITATION.

BY H. E. COOK, Denmark, N. Y.

Mr. Chairman, and Gentlemen of the State Board: I want to say by way of introduction and preface, that this is the first oppor-

tunity I have had to meet the farmers of Pennsylvania, and I feel that indeed I have been honored by this Board in coming here for a time to discuss the subject of stable sanitation and construction. Not before in the history of dairying has there been so much interest in this subject. We have now reached a point where we can safely advise a certain style of construction that will give satisfactory results.

Again, as it concerns the health of our farm animals. I do not believe that we have spent time enough and given that side of the question enough consideration, for we all know that is a very important question, anything that will promote the health of our farm animals. We have spent a great deal of time trying to clean out tuberculosis, but I do not believe we will succeed until we give our animals more cleanly conditions. If there is a germ anywhere in this country, and it is turned loose in ninety per cent. of the stables in New York, that germ will develop and grow. Why? Because it is so dirty, unsanitary, in so many stables. I have been nearly laughed off the platform for making the statement, Mr. Chairman, that the place fit to produce milk for human food, ought to be a place clean enough in which to make bread for the household. It is true, yet people laugh at it. They say, what do you mean? Go down in the stable to make bread? Well, not in a good many of them, and yet, do you know, it would be safer for the human family to have the bread made in the stables just as we find them to-day, festooned as they are with cobwebs, and reeking with filth, than to drink milk made in such stables. Is that too strong a statement? I do not believe it is. The trouble is, our view-point has not been right. When we have talked about these cleanly conditions, and this intelligent effort to clean our stables, people have almost ridiculed the idea as though it was too trifling to be worthy of consideration.

This human food, we should remember, is growing more babies now than ever before, so that the conditions under which cow's milk is produced, are certainly of the greatest importance, and if we do not properly attend to them, we will have to suffer for it. We want to give more consideration to the production of milk, than any other single food that we produce.

Now let us see if we cannot carry on a system of construction that will be applicable anywhere, whether it is in the cold northern section of New York where I live, or whether it be here in this possibly more congenial clime, or anywhere that we keep cows; and I believe we are in a position to-day where we can do that, and I want to give a great deal of credit to Professor King, of Wisconsin for it. I am sure that it is not too much to say that Professor King has done for our animals—the health of our animals—as much as Dr. Babcock has done for the quality of our milk. I believe in giving a man credit when he does a thing, and not wait until he is dead before we tell him that we appreciate it.

GENERAL BEAVER: From the standpoint of the human family, and its interests, no doubt a question of great importance is involved, and I would like to inquire if you take that up in your lecture as a special feature.

MR. COOK: No, only indirectly. If the character of our milk is such as we ought to have, it must be produced under certain conditions of sanitation.

GENERAL BEAVER: I mean whether you treat as a special feature the effect of milk upon the human family in your lecture?

MR. COOK: No, sir. You have doctors and professional men who know all about these things, and I do not go into that because I find that within the limits of the time allotted, I have more than enough to talk about anyway without trespassing upon grounds with which I am not familiar.

I am not disposed to waste time in generalities at all and so I want to get to this subject. I am not here this morning to talk to you people, let that be understood at the outset. I want to talk with you. It makes a difference whether you are talking to a man or talking with him. If you are talking with him, he will do half the work, and that is very much easier than when you are talking to him for then he expects you will do it all. When I started out six years ago to work along these lines, I found that fifteen minutes or half an hour was a long time, but the subject has grown so big it takes a good deal longer time now and it has become rather a question of packing it into a little time. I spent an hour each day of last week working with the students of our State College along this line of barn construction and barn sanitation, which I believe is one of the most important questions that we have to deal with to-day, especially on our dairy farms, for several reasons: First, milk is one of the cheapest human foods that we have, and one of the best, a food that is almost entirely digested and a very important food that contributes to the means of living for so many men, and getting to be a great commercial proposition—the selling of milk.

From that point of view, I believe we ought to look seriously at the production side of it that we may make it possible for the people in the cities to get better milk, and cleaner milk, and in my judgment that will largely settle the question of price, and unless we have an understanding of the methods of barn construction and the principles that govern it, it has been my experience and observation that we do not reach the results we ought to have. A gentleman last winter asked me to go out with him to see how he could best put in a system of ventilation. When we walked into the barn—it was one of those older stables with a low ceiling—I took out my knife and went right up through the ceiling. I said, you don't need ventilation here, you have got so much ventilation now that if you could market this ventilation it would bring you more money than your milk product. I said when it is warm outdoors, it is warm in this barn, and when it is cold outdoors it is cold in here. He didn't have an idea of the first principles of ventilation. When we go into one of those barns—one of those old fellows where you can almost throw cats through by the tail—there is no use of bothering about ventilation. The first thing that man wants to do is to buy some lumber and paper and build over in a proper manner.

What we need to do in our cow stables, is to conserve the heat of the animal, and still give them pure air. Now how shall we get it? The further north you go the more necessary it will be to have, what

I call perfect insulation, that is, the surface of the walls inside of the barn so constructed that they will keep dry; in fact, the question really hinges upon that point of keeping our animals dry, because in a moist atmosphere there is always danger, and while you may or may not know the full bearing of this—I presume Dr. Armsby knows, and I wish I had the opportunity to ask him some questions along this line—but I may say to you that a cow weighing a thousand pounds will throw off from her lungs and her skin, about seven pounds of water every twenty-four hours. Now we want to build so that in the cold weather, that moisture won't condense on the side walls of the stable. Haven't some of you seen it there? Damp, side walls, wherever you have looked on every side, in the winter?

I bring to mind a man who, last winter, built a new barn, and he built it tight and close and stopped every crack and corner, yet he noticed this dampness of the walls, and he says, "I am sorry I put water in my barn;" he thought it came from the water supply, but it didn't, not at all, it came from the cows. If you have thirty cows in your barn, you have two hundred pounds of water every day that has to be lifted out of the building. Now if your side wall is cold, it is bound to condense there, and you want to prevent that, that is what we want, and the great question is, how to do it. There are several ways to do it. There is one way that I believe is the best way for ordinary buildings, viz: To ceil inside and outside of the studs or girths and fill the space with straw or dry shavings. They are inexpensive and most valuable insulating materials. Of course if you are building of concrete, you can do it effectively with little trouble. If you have two walls, we will say four inches thick, you leave eight inches of space, and this should be at the top and at the bottom, like this (indicating on blackboard diagram) that is dead air space and will serve to insulate the inside of the room, but it is almost a physical impossibility to build a dead air space with lumber unless you build for cold storage, and I don't believe it is necessary. Of course if you furrowed out here (indicating) and put on another, say here (indicating), and so on until you had three dead air spaces, it would serve the purpose. The trouble is right here; say that is the outside of the building (indicating) and this is the inside, with a single or double thickness of matched lumber on the outside wall, leaving a little crack right there (indicating) and another little opening down here in the bottom (indicating). In the winter time the cold air will get in here and start itself in motion, then the inside of the stable wall is cold.

Do not build the ceiling too high. Bring the ceiling down to at least eight or nine feet. If the stable is large it really needs about nine feet. It is of no use when you get up above seven or eight feet, there is no use in making it higher for the ordinary sized stable. Some of our New York builders are building larger and larger. I know of one stable built twenty feet high, and they actually had to put in another row of windows in order to float the moisture out of the room. Now you do not need that, so I say bring the ceiling down.

Now about light. Each cow should have at least four square feet of window space; that is not extravagant. More, rather than less. There is a difficulty in an excessive amount of window space if that

heat very rapidly radiates out. Double windows should always be provided, in fact, any stable like this would be compelled to put in double windows to prevent frosting in the more northerly latitudes. In my own case, we use a sliding door on the outside, and swinging door on the inside; in the summer time they can be taken off and put away.

A Member: In most of our Pennsylvania bank farms it is not possible to get that much window space on account of the bank.

MR. COOK: That may be; I am not familiar with your conditions in that respect. Another point, and that is, the location. We have got all these problems to deal with, but I find that by careful study of certain principles, we can usually work out the desired results. Of course I am speaking now more particularly to the man that is going to build new; but many of these things can be applied and we can adjust them to the location that we have. In building new, if it was possible I would have a stable located as near as I have indicated there perhaps to the north and south line, that is, I would have this exposure over here to the south or the southwest. I would prefer a south or southwest exposure if it is possible to get it. Of course it is not always possible, and where it is not, we have to do the best we can, but it is desirable for the reason that we get the largest amount of sunlight during the winter time through windows that have that exposure. I have a barn and it was fortunate that I could give it this exposure without any trouble at all, and from the early morning until late at night, the cows are really bathing in the sunshine. Now with almost any other exposure there would not be that advantage.

MR. HUTCHISON: Have you ever remodeled any of those barns like we have in Pennsylvania?

MR. COOK: No, I never was in Pennsylvania before.

A Member: Where there is a great deal of bank surface, you would have to set the windows on top with chutes up to them and up to the mow.

MR. COOK: What we want is the sunlight, because you know what effect that has on germ life.

A Member: Do you think it to be practicable to remodel bank barns?

MR. COOK: I think it would be pretty hard work to remodel them and to create the conditions that we would like to have.

PROF. SHAW: Do you think a southwestern exposure for the sake of admitting more light in the winter, is always desirable? Suppose you lived in a country where the prevailing winds blow from the southwest? Don't you lose a little in having your buildings face the southwest rather than the south or the southeast?

MR. COOK: I do not see that you do so far as the sunlight is concerned.

PROF. SHAW: No, but so far as the warmth is concerned?

PROF. COOK: Well, if your building is properly insulated, I do not believe it will concern the temperature inside of your stable.

PROF. SHAW: Suppose you were to turn your cows out, as I understand you do, and you turn them out in one case in a yard that is protected from the wind and in the other case it is exposed a little bit to the wind, you work a little bit to a disadvantage there, don't you?

MR. COOK: I would not turn out milch cows on a day when the weather was not genial. I would rather have them on the inside than on the outside.

PROF. SHAW: The day might be genial but not quite free from wind if facing a southwest exposure.

MR. COOK: There might be a condition there that would have to be considered.

MR. HERR: In our bank barns that are closed up, wouldn't it be well to build a warm shed where cattle could stand part of the time on the inside, when they couldn't get out on the outside without being exposed to the wind or to the cold?

PROF. COOK: The question of covering a barnyard where bedding is high priced and difficult to get, as it is in New York and New England, is an abomination because of the difficulty of keeping them clean. Where the question of bedding don't concern you, then it is worth your consideration. The covering of a barnyard where cows can be turned in, in conditions like those, and which we will have perhaps during the greater portion of the day in the winter, may be desirable. If this is done, they should be put into the stable for feeding and for milking.

MR. HUTCHISON: Did I understand you to say that you don't have any bank barns in New York State?

MR. COOK: No, I didn't say that. We don't have a barn in New York built as I indicated here. (Referring to a sketch made on blackboard.) I don't know of any such barn in New York where there is a projection.

I would like to ask how many men here are using cement in their stable construction?

A Member: A good many.

MR. COOK: With us a good many keep animals directly on the concrete. I would like to ask if you have any trouble; I would like to know what the sentiment is here.

A Member: I prefer to keep cows on a plank floor rather than on a cement floor.

MR. COOK: That is perhaps because the floor is cold and often slippery, but that usually comes from men who built the floors a dozen years ago, but it is principally because of the fact that they are cold, that they are objected to, and they are cold, there is no mistake about that. Concrete is a good conductor of heat, but I feel to-day

that we can get around that so easily and so cheaply, that we ought not for a moment to consider the use of plank over concrete because the plank will soon wear and soak up the liquid, and the planks are objectionably dirty, and I do not believe that we ought to consider them as fit material for use. I think that we ought to get every last trace of a board or any sort of lumber stuff out of our stables that we can. I don't know whether you are going to take kindly to that, or not, but so far as my opinion is concerned, that is what I believe.

I want to show you just a moment in one of our barns what we are doing, where we are not even using mangers. A person may say, I don't like that, and that the old fashioned manger is good enough for them, the old fashioned manger which came up about three feet high and one of the most difficult things in the world to clean. And what are the results. Why, they don't clean them, that is all. If they are feeding silage, the boards get sticky, and that is a splendid place to develop all kinds of germ life, and I am against the proposition. Now if you want a manger, here is one that it seems to me—I have not drawn it very artistically—but perhaps after I name it you can tell what it is, in fact, that is the floor line, and this is a representation of the side of the barn, and here is the manger. Now the manger ought to have just a little inclination toward the passage way or walk, inclined just a little; remember this is a sectional view. Right in front of your manger put in just a little depression, not very much, perhaps an inch, then it gives an opportunity for the water to run off. This floor slants slightly towards this little depression, and this of course will be carried the whole length of the stable. Now that is the manger. That could be changed a little in form. Don't build this over eighteen inches from that point on the floor line. There is much to commend in using a cement manger on the score of cleanliness, and as meeting sanitary conditions.

(Mr. Cook made a diagram upon the blackboard showing the form of a stanchion which he recommended, and made an explanation in regard to same that would not be intelligible without the diagram with proper references to the various parts of its construction.)

A Member: I would like to inquire what would be the cost of these stanchions where you are putting up, say, fifteen or twenty?

MR. COOK: Including the pipe and everything?

A Member: Yes.

MR. COOK: It will cost about five dollars.

A Member: Per cow?

MR. COOK: Yes, which will include, what it seems to me is the best construction, which will be by putting in a piece of pipe of the same size anchored in the cement at this point and coupled here with an L making it a little less than three feet to that point shown by that line. (Indicating on board.)

A Member: How far apart?

MR. COOK: That will depend on your cows, of course; large cows three or four feet, small cows less. If you take these dimensions, I think you will find that will give about the best form; there is a little danger of their feet getting in here.

Now to come to the question of dampness, in a building, in a room where the temperature is low, there will be more or less moisture. I spent two or three days with one of the best concrete engineers that I know so as to be sure about my position, and this is what they are doing. Now let that represent the concrete foundation. (Indicating on blackboard.) Of course that may be of gravel or crushed stone, or it may be of the little field stone. All my concrete work has been built of little small stone about the size of my fist, and then they are filled in with sand and cement. Where you can get them, they are the cheapest; it is the cheapest way to build the foundation. After that work is done, then they proceed to put on the top paper. First, before that is put on, the surface is covered over with tar paper. (I can show that better here.) We will just coat this over with tar paint, and then we will cover that with a single sheet of tar paper and then we will coat that over again, and so on until we have got three thicknesses of tar paper thoroughly cemented on, then go on and put on your finishing coat. The only thing that I think it necessary to advise is, let that finishing coat be a little thicker.

A Member: Don't that scale off?

MR. COOK: No; I think it is fairly safe to say that that may be from an inch and a half to three inches. Take this portion of the barn here where it is only used for a walk, and mangers, or a passage, it is not necessary to have it thick, but in this portion back here, if you draw out your manure with a pair of horses, that is probably the hardest strain that comes on the concrete. Of course, where the union is formed it is not necessary to have it as thick as that. Three inches above the paper will do. It ought to be at least three inches thick where the strain is heavy.

We want to finish it up with a straight edge, and while there are different methods of giving this rough, sandpaper finish, one is to sprinkle on some sand and cement after it has just set a little. Another way is to take a broom and go over it, but it seems to me that they are crude compared to going over it with a board trowel, and that will work up that sandpaper finish which makes the floor as safe for an animal to walk on as plank; the coarser the sand, the better. It ought to be coarse, sharp, clean sand; the nearer it meets these conditions the better will be the surface finish.

A Member: Do you want that board rough or smooth?

MR. COOK: I have always used a smooth board. It gets rough, of course, in a few minutes.

A Member: Does that exclude the moisture?

MR. COOK: Yes, I understand it does; men tell me it does.

After the experience I have had with concrete for six years, I would not let a man come there and put in plank under any consideration.

A Member: I had to go and put down planks for my brood sows; I lost some because I didn't do it sooner.

MR. COOK: You were certainly right, sir, with an animal, a sheep or a brood sow—they must not lie on cold concrete; but where that is covered with dry straw, there is a perfectly safe proposition, and our sows have raised their pigs and gone through the winter. And I would like to tell you, if I had time, the method we used in that building for successful and easy cleaning.

A Member: Couldn't you use an inch or so of soil right on top of that concrete?

MR. COOK: Yes; but it would not be so good as the straw, of course.

Adjourned to half-past one o'clock this afternoon.

Harrisburg, Thursday, 1.30 P. M., January 25, 1906.

The meeting was called to order at the designated hour with Mr. S. M. McHenry in the Chair.

Reports of Specialists and Standing Committees, continued.

COL. WOODWARD: Mr. Chairman, I was requested by Mr. McGowan to express to the Board his great regret that he cannot be here this afternoon, and to say to the Board that the cause of his absence was the sudden death of his nephew.

The SECRETARY: He left his report with me and it can be read, or filed and printed.

On motion, duly seconded, it was agreed that the report of Mr. McGowan on fertilizers be filed and printed, which is as follows:

REPORT OF COMMITTEE ON FERTILIZERS.

HOWARD G. McGOWAN, Chairman.

The use of Commercial Fertilizer upon the farms in Pennsylvania continues to be forging ahead with no halting whatever, which seems to say, if you want increased crops, you must use Commercial Fertilizer.

Although Commercial Fertilizer can be made to supply the elements that are wanting in the soil, the use of barnyard manure that has been thoroughly fermented will supply all that may be required by plants.

The point in selecting fertilizers is to procure those brands that assist to make the barnyard manure more complete. Barnyard manure is very rich in nitrogenous materials.

"Rich food makes rich manure." Farmers want to make more of a study of the value of the food as a fertilizer for the land, after it is fed to the animal. While our farmers are devoting and spending hard cash for fertilizers, there are countries that pay more attention (and advisedly so) to the value of the food given to animals as a fertilizer for the land. Cotton seed meal, gluten meal, bran and many other products should be fed with an eye open to the fertility that they contain for the enriching of the land.

A recent bulletin estimated that five-eighths of the plant food in the manure of farm animals is contained in the liquids. A large part of this liquid is lost through the barnyard on many farms. The annual value of the manure of one cow is about \$19.00, hence five-eighths of \$19.00 or \$12.00 can easily be lost by many farmers if the greatest care is not observed.

In Germany premiums are offered for the best systems of taking care of farm manure. The Pennsylvania farmers would do well and reap a much larger profit from their farms if they would be more painstaking with the farm manure as a fertilizer.

Though no correct estimate of the value of farmyard manure can be made, yet the following is an approximate value arrived at: The value from cotton seed meal is about \$28.00 per ton, linseed meal, \$20.00, beans \$16.00, bran \$12.00, clover hay \$10.00, timothy hay \$4.84, corn meal \$7.00, straw \$3.00, and so on.

The value of manures, however, depends not only upon the food, but also upon the condition of the animal that makes it and the fluctuation of the market. Just as soon as farmers can be induced to experiment on their farms more, if only on a few small plots, they will become converts to the many advantages in using Commercial Fertilizers in forcing the land to give larger crops. We are now learning that a greater value is contained in an insoluble Rock Fertilizer than we were led to believe years ago. The preference is given an insoluble phosphate that can be dissolved but slowly in the soil, through the agency of the weak vegetable acids, but which will

accomplish the desired results if the farmer can afford to wait two or three years for the return of his investment. Farmers, nevertheless, require soluble and immediately available plant foods if they wish to realize in the shortest period of time and derive fair profits. Insoluble or soluble, which is what we ask from our learned men.

The output or sales of fertilizers by the manufacturers in the State has been larger than for any previous year. Farmers are using more fertilizing per acre on their farms or on their various crops and find it pays them to do so. In Pennsylvania, it is said, almost five millions were spent for fertilizers the last year. Some use as much as one ton per acre. To show how rapidly, comparatively speaking, the fertilizer sales are increasing, we can judge by noting the following output in the little country of Australia since 1897. In 1897, 3,000 tons were used; in 1898, 12,500 tons; in 1899, 16,500 tons; in 1900, 24,600 tons; in 1901, 31,400 tons; in 1902, 37,500 tons; in 1903, 44,500 tons; in 1904, 52,000 tons and in 1905, 56,000 tons. This shows a constant gain in the use of fertilizers, more than double in five years. Pennsylvania shows a like increase.

A fertilizer has two values, its commercial and agricultural value. Its commercial value is determined by the market value of its constituents and the cost of the labor required in preparing it for the farmers' use. The agricultural value of a fertilizer is the increase in quality and quantity it will produce in the crop to which it is applied.

Germany claims to have increased their crop production sevenfold by the use of fertilizers. The fertilizer market has taken on a tone of increased activity. Japan is becoming a good market for new fertilizer materials and other countries are following suit.

The proper application of any kind of fertilizer to the soil largely depends on the previous crop, the kind of crop desired the next season, an even distribution of the fertilizer over the surface, while some experience may be of assistance in using fertilizer as well as in preparing it. Land rich in potash is not particularly benefitted by an application of that element and the same may be stated of phosphatic and nitrogeous materials. It is needless to say that commercial fertilizers, to be complete, must contain three elements, ammonia (or nitrogen), phosphoric acid and potash.

We believe, taking our State over, that the tendency is towards using complete fertilizer.

We are familiar with a farmers organization that orders large quantities in the spring of the year of a complete fertilizer, the analysis of which was ammonia 3, acid 7, potash 12. With very little modification this formula is used with good results throughout the whole season.

Every dollar put into fertilizer and used on the farm is equivalent to making deposits in bank for the future, while the investment will be safe at all times.

The farmer who has a large heap of manure is the one who should purchase fertilizer, as the combination cannot be surpassed. There are some users of fertilizers who frequently want to know from what source the different elements in a fertilizer are derived. For instance, a fertilizer contains 3 per cent. ammonia. The idea is that the manufacturer should state upon the bag or sack from what source the ammonia is drawn, whether from nitrate of soda, blood, tankage

leather scraps or whatever else. Likewise with the phosphoric acid and potash, whether the acid is derived from animal bone or from S. C. rock, or whether the potash is derived from muriate, sulphate or kainit, and so on. This by our State law is not required at present. Whether it would be better for the consumers' best interests to know or have this information given as above set forth is an open question. The farmer needs, however, all the light and protection that can be thrown around him in respect to the proper purchase of fertilizer for results.

Year after year, farmers are using commercial fertilizer more intelligently. The farmers' institutes are proving a great factor in educating the farmers along these lines, and the many bulletins sent out by the Experimental Stations are giving to the farmer a vast amount of valuable information along the lines of using fertilizers.

The Department of Agriculture by its special agents being sent out over the State to collect fertilizer samples under the direction of our Honorable Secretary of Agriculture, N. B. Critchfield, is doing a valuable work collecting these samples, which samples are subsequently analyzed by the chemist. The results of such analysis being published and sent out broadcast over the State is doing a vast amount of good for the farmers.

No one need be in ignorance as to the proper use of commercial fertilizers. Every farmer can know when he buys a ton, and know just as well what he is doing, as the man who knows when he buys a suit of clothes, or any other commodity on the market. Farmers post yourselves about the judicious use of fertilizers. Study analysis. No study will pay any better. The land is the farmers' bank, and when the land is enriched through the judicious use of commercial fertilizer his bank account will be increased, from which or by which he makes himself a business man of greater use and influence in the community wherein he resides.

He who makes two blades of grass grow where only one grew before, is a public benefactor.

The CHAIRMAN: Our next number on the program is the Report of the Meteorologist, E. R. Demain, Harrisburg, Pa.

Mr. Demain not being present, his report was passed.

The CHAIRMAN: That brings us down to our regular afternoon session, and the first number on the program is the Report of the Committee on Floriculture, Edwin Lonsdale, Chairman, of Girard College, Philadelphia, Pa.

DEPUTY SECRETARY MARTIN: Mr. Secretary, I handed you his written report, and we received a letter from Mr. Lonsdale stating that he could not be here owing to certain business reasons; that report is in your hands.

The SECRETARY: That report can be read or printed as the other reports were.

MR. SEXTON: Mr. Chairman, I move that the report be received, placed on file and printed.

Motion being seconded, it was agreed to.

The following is the report:

REPORT OF COMMITTEE ON FLORICULTURE.

BY EDWIN LONSDALE, Chairman.

Information comes from every direction that the business in flowers and plants has been the best ever known, especially does this statement apply to the amount of trade done at Christmas time. And owing to the excellent weather conditions during the Fall and early Winter, the flowers produced were of the very best quality, and the prices realized were a little better than usual. This applies to the better class of both flowers and plants.

The demand for plants in bloom for Christmas gifts is still on the increase, and the weather being all that could be desired at the time for delivery, such trade is most satisfactory.

Cyclamen plants in bloom are among the favorites for Winter. The flowers vary from pure white, through various shades of pink and crimson; some of the white varieties have a crimson eye. They make an excellent plant for the house, but do best in a room not too warm, say as low as 45 degrees at night. In a window in a room on the north side of the house I have known individual flowers to last in good shape for six weeks. This plant, like all others for home adornment, must never be allowed to become dry. It is the safest way to water them at least once a day. There are more plants killed by neglect in watering than all other causes combined.

Azalea plants in bloom also continue to be popular. The colored varieties, as red or pink and mottled for Christmas, and the white ones for Easter.

For the Christmas holidays the Poinsettia continues to be the most popular plant grown for its brilliant red bracts (surrounding the flower), being so bright and cheerful. Botanically it is now classified with Euphorbia. Euphorbia Poinsettia is the name now given, but to the gardener and flower grower it will ever be called the "Poinsettia." This is a native of Mexico. It is very accommodating and lends itself to more than one method of treatment. It may be grown on stems from three to six feet long, crowned with a cluster of its bright red "leaves" on top; or by putting cuttings or slips in the propagating bed in July and August plants from six inches to a foot high may be had in bloom for Christmas. The tall ones are generally used for cutting and the latter as pot plants.

Another flowering plant similar in character, also blooming at Christmas, is what is known among the fraternity as Euphorbia Jaquinuacflora, but now the botanists pronounced that name to be wrong and should be *fulgens*, not such a formidable looking name assuredly and much easier pronounced, but the old florist and gardeners will continue to call it by the first name given for many years to come. The flowers of the Euphorbia just referred to are much smaller, but more numerous than the Poinsettia, and are studded quite thickly along the gracefully arching branches, and have a dash

of yellow in their coloring which gives them a brilliant orange tint approaching scarlet.

The brilliant shades of red in the Chinese Primrose are as popular as ever. It is easily grown from seed and is a satisfactory flowering plant for the windows in the cool rooms of the house, but the temperature of said room should never be allowed to go below 45 degrees.

Palms are always in demand. The "Rubber Plant" (*Ficus elastica*) is not as popular as it was a few years ago, though still one of the very best plants for the house.

The so-called Boston Fern increases in popularity. It is so easily grown and gives such general satisfaction that its present popularity is well earned. By selection and cultivation quite a number of varieties may now be had of this fern. The one called *Scottii* still holds its own, being a dwarf and of a more compact form of growth than the older variety. There are some with the fronds of much larger proportions than the "Boston," being very much divided, resembling somewhat an ostrich plume. This is called *Elegantissima*. The other new varieties are similar to the last named, but each varies somewhat in some one particular. A competition has been arranged to take place at Horticultural Hall, Broad Street, Philadelphia, during the Chrysanthemum Show next November, where all the varieties of the Boston Fern (*Nephrolepis exaltata*) may be brought together so that the judges may pass upon them and say which they believe to be the best. Every one of them are satisfactory as house plants, so that what the judges agree upon will not decide which is the only one to grow.

Plants with berries, as the *Ardisia Crenulata*, are very popular, so also are what is commonly known as the Jerusalem Cherry, which is not a cherry at all nor anything near to it, but is a solanum (*Solanum capsicastrum*), which belongs to the egg plant, peppers, tomato, and potato family, but is used only for ornamental purposes, its orange colored fruits being quite attractive to look upon. These plants are readily raised from seed and grow to a fair sized plant in one season. Each fruit contain a number of seeds, so that it may be raised inexpensively.

Orange plants in fruit are also grown in quantity in pots for Christmas. This species grown is known in catalogues and encyclopedias as the Otaheite Orange. Its habit of growth is dwarf and bushy. The flowers are fragrant and the fruit is edible, but the flavor is not of the best.

The *Aucuba Japonica* is a plant very attractive when its plentiful and oval-shaped berries are red and ripe. This plant is imported from Europe generally already with the fruit fully developed. Botanically it belongs to the dioecious class of plants, which means that some plants have pistillate flowers while others have staminate flowers, the former bearing the berries. In order to cause them to form their attractive berries, the pollen from the staminate flowers must be applied to those with pistillate flowers. In this connection the European nurserymen refuse to accept orders for only the pistillate variety, so as to keep the trade in this particular class of plants all to themselves. This can be overcome, of course, by retaining a plant and sowing the seeds as soon as ripe, and in the natural order of events in due course the young plants resulting therefrom will, when sufficiently mature to flower, be found having both forms in less or more

equal numbers, but to do this takes time, and as this plant in Pennsylvania, unless in very favored localities, is not quite hardy, it will be necessary to give the plants greenhouse protection. Until the sex, so to speak, of each plant becomes known it would be quite expensive, and in these strenuous days and the desire to become rich quick, commercial men hesitate to undertake it, feeling the uncertainty of the undertaking for immediate profits, but farther south of Pennsylvania or possibly in some favored spots in this great State, it would undoubtedly prove to be profitable when grown outdoors.

In many parts of Great Britain the Holly—native to that country—with its bright red berries, is more symbolical of Christmas than any other one thing: No matter how poor the family, a few sprigs of Holly in fruit will surely be seen in the windows at that season. The English Holly (*Ilex ovalifolium*) from a decorative viewpoint is superior to our native Holly (*Ilex opaca*), being a much more rich green in color, contrasting with marked effect with the red berries.

I referred to this Holly in last year's report. I want to emphasize what I said then with as much force as possible, urging some young man to begin experimenting as soon as possible, for this Holly is slow in growth and for a time disappointments must be looked for. Our Commissioner of Forestry would be a great help in this matter. He could tell us where the best prospects for a success in experimenting could be made. The European Holly needs rich, moist land, where the frost is not too severe, on a north hillside where the sun would not be likely to shine upon them in the winter time, early in the day, when the trees were frozen, would be the most likely place I would think to make the experiment, and the north side of a hill it is natural to suppose would be more moist than would be the case on the south side, less evaporation going on in that situation. But about the richness of the soil I don't know. Hillsides, as a rule, are not considered very rich in plant foods, on account of the wash naturally taking place during heavy rains.

This Holly is sub-dioecious, so that it would be necessary to have some of the staminate varieties in every plantation. It would be best to secure seedlings from a reliable nurseryman in Europe, and it is reasonably sure that plants with both characters would be among them. There have been described over one hundred and fifty distinct varieties in English horticultural publications, some varieties having flowers with both pistils and stamens. Varieties with beautiful variegated foliage are among them and are very ornamental in the climate of the older country, retaining the variegation all through the seasons. During the past holiday season I saw two hundred beautiful specimens that had been imported. They were uniformly pyramidal in shape and very full of berries, and sold at four dollars each. The native species, *Ilex opaca*, though not so valuable for decorative purposes, is very useful on account of its evergreen character and its bright red berries. It also has the advantage of growing satisfactorily in very poor soil. It is also much hardier, enduring colder weather with less injury than its foreign relative.

Among flowers, there is very little new to report. The American Beauty Rose still holds its own against all comers, but the red Rose Liberty has a very formidable rival in the new Richmond. The latter may be a trifle lighter in color than the older variety, but the casual observer cannot tell the difference, and it has the great advantage

to the producer of flowers of being a variety that is far easier to grow, and consequently to bloom more freely. This, of course, is what has to be looked out for, for no matter how beautiful and desirable a flower may be, if it cannot be grown to produce flowers in sufficient quantity to be profitable, it of necessity must be dropped.

New carnations continue to be produced, proving to be both desirable and valuable. According to the daily newspapers, a new variety has recently changed hands for an amount said to be \$40,000. This is said to be an improvement on the celebrated "Mrs. Thomas W. Lawson." It is known by the high sounding name "Aristocrat."

Among scarlet carnations,—and this is a very desirable color, more especially at Christmas,—there are two new varieties of that color, the respective owners of which are striving for supremacy. These are the "Robert Craig" and "Victory," both of which are meritorious varieties. Unbiased judges are inclined to the belief that the former is the better flower, but the latter is the freer bloomer. May the good work go on.

MR. KAHLER: Mr. Chairman, the Committee on Legislation is now ready to report.

The CHAIRMAN: If there are no objections, we will hear the report of the Chairman of the Committee on Legislation.

Mr. Kahler, the Chairman of the Committee on Legislation, presented and read the report of the Committee, which was as follows:

REPORT OF THE COMMITTEE ON LEGISLATION.

Mr. President and Gentlemen of the Board:

At the meeting of the State Board of Agriculture in 1905, in which there were quite a number of bills formulated by the Joint Committee of all the Allied Organizations pertaining to agriculture; namely, Stock Breeding, Butter Association, Poultry Association and all other kindred associations. A number of said bills were approved and presented by your Committee at the last session of the Legislature. Your Committee is sorry to report that a very small per cent. of said bills received favorable consideration and were enacted into law, and in this report we wish to show our appreciation by thanking the Members of the Legislature and the Governor of the Commonwealth for his approval and to any and all who have contributed towards the passage of the following bills:

The Appropriation Bill to pay the expenses of the Board attending the Annual Meeting.

For the small amendment to the General Road Bill, whereby the counties and townships are relieved of one-sixth of the expense imposed by the original bill, and making it one-eighth.

Some improvement to the Local Road Bills, allowing the townships to elect three supervisors and to appoint path-masters and allowing the townships to vote as to whether they work out or pay money for tax

An appropriation to enable us to stamp out the Scale of this State,

We would suggest an Amendment to the Township Road Bill, wherein it provides that the State pay 15 per cent., where the township vote to pay tax in cash, we would insert to word 40 per cent.

But we deplore the action of the Legislature in not allowing trolley cars to carry freight. While we favor the trolley system and are willing to make some sacrifices, we think that we are entitled to more benefits than we can derive merely from passenger traffic. And we also recommend to the Legislature that hereafter we are emphatically opposed to trolley systems occupying our public roads. The using of public roads endangers the public travel and makes travel hazardous, and greatly interferes with the proper improvement of our public roads. We think that we are entitled under the circumstances to have the trolley lines carry our freight to and from the market.

We recommend a further amendment to the General Road Bill; that the words "county and township" be eliminated from the original bill and the Road Commissioner to have entire jurisdiction under the bill to proceed without the consent of the County Commissioners and County Supervisors, which, in our judgment, only complicates and hinders the working of the bill and would relieve local taxation to that extent and place the costs upon the State where it justly belongs. We would further recommend the enactment of a law whereby the personal taxes and the license fees should be retained in the counties in which they are assessed, thereby relieving our overburdened taxation. We further recommend an increased appropriation for our township high schools, thereby assisting our rural districts to maintain a Centralized High School System.

While it is recognized that agriculture is the seat of all prosperity of our country, we do recommend that the Legislature make a larger appropriation toward carrying on the Farmers' Institute work. We therefore recommend that \$50,000 should be appropriated instead of \$35,000.

All of which is respectfully submitted.

Signed by the Committee,

A. J. KAHLER.
M. N. CLARK,
JASON SEXTON.

On motion, duly seconded, it was ordered that the report be received and placed on file.

The CHAIRMAN: We will now hear the report of Prof. Menges on Entomology.

Prof. Franklin Menges, of York, Pa., presented and read his Report on Entomology, as follows:

REPORT OF THE ENTOMOLOGIST.

BY PROF. FRANKLIN MENGES, York, Pa.

The Entomologist of this honorable body would respectfully submit the following as a suggestive report:

The San Jose Scale still occupies the center of the stage in insect depredations and keeps the Entomologist of the State Department of Agriculture and his assistants busy giving demonstrations for its extermination, arousing fruit growers and farmers to realize the imminent danger in which this insect places their industry.

We suggest that this body give the Department the fullest cooperation, and assist in this final effort so that we may soon be privileged to say, "Well done, good and faithful servant," and sing the requiem, peace to the ashes of the San José Scale.

While doing Farmers' Institute work at Fort Littleton, Fulton county, Mr. D. W. Froker showed me corn stalks infested with what seemed to be the Corn Stalk Borer. These larva bored about in the pith of the corn stalk, and while they did not kill the stalk, they weakened it to such an extent that no ears were produced. We would suggest that this insect be thoroughly investigated.

Another insect, which is by no means new, the Bronze Birch Borer, seems to be becoming more numerous in the northern part of the State; and as the English Sparrow seems to be driving out the natural enemy of the Borer, as well as that of a large number of others—the Woodpecker—it increases in numbers and is now destroying the White Birches in many localities. This I have only from hearsay and not from personal knowledge.

A NEW DEPARTMENT.

By an act of the Legislature of 1905, the new Department of Health of the State of Pennsylvania was created. This Department is under the direction of Dr. Samuel C. Dixon. Dr. Dixon has a local representative in every county, town and city in the State, whose duties are to prevent the spread of contagious and infectious diseases. We think this Board should lend its influence to this new Department, and to Dr. Dixon, in its effort to frustrate and stamp out these diseases in this State, especially because the spread of these diseases is often directly or indirectly traceable to the farm, and if not so traceable, the farm is usually blamed for the infection and contagion.

Insects play no small part in this infection because they can either act as mechanical carriers of these germs, or as an intermediate host, or a necessary element in the life cycle of the disease germ.

One of the commonest and most frequent is the carrying of typhoid fever germs by flies. The bacilli, which are found in the excreta about the premises where typhoid fever has prevailed, adhere to the feet of the flies and are carried in the next flight to a dish of food allowed to remain exposed in the culinary department of the house, or a milk pail, or even to the dinner table. By means of the food, the germ will gain entrance with the elementary canal often with disastrous results. This has been fully demonstrated in the army camps of the Spanish American war. But typhoid bacilli are not the only ones transported in this way, but well nigh conclusive evidence is on hand that the germs of Cholera, Erysipelas, Tuberculosis and Bubonic Plague have been carried in this way. Neither are flies the only carriers, but other blood sucking insects, such as mosquitos, bed-bugs, flees, etc.

Not only do these insects carry disease germs by adherence to the external parts of their bodies, but experiments have shown that various bacilli may pass unharmed through the intestine of the fly and be recovered in the ejections of these insects. This is not only true of bacilli but eggs of such parasites as the tape and round worms, have been found unaltered in the droppings of flies. I have already intimated that insects are frequently an intermediate host or a necessary element in the life cycle of disease germs. Thus the embryonic round worm in the human blood must be drawn into the stomach of the mosquito, wander out into the thoracic muscles and grow to a definite stage of development before they can again enter the human host and become sexually mature adults which produce the blood inhabiting embryos.

In case of Malaria, the germ must be drawn up into the stomach of the anopheles mosquito and within its body undergo a complicated series of changes before the new generation is ready to be injected into the human blood, where they produce a new case of Malaria. The biting insect is not only an essential, but it is equally necessary that the organism pass through the changes in the mosquito before it can infect. This has possibly been more clearly shown last summer in the Yellow Fever Epidemic at New Orleans. It was shown that a specific type of mosquito (*Stegomyia fasciata*) designated often as the Yellow Fever Mosquito, transmits this disease. This mosquito acquires this power by feeding on the blood of a Yellow Fever patient, but can infect or introduce the disease only after a lapse of ten or twelve days. Before this time the bite of this infected mosquito is harmless, therefore, it seems only reasonable to conclude that the organism passes through certain stages necessary in its development to reach the condition in which it is able to re-enter the human frame and infect susceptible persons. During the prevalence of Yellow Fever at New Orleans last summer, Dr. Dixon, the State Health Officer, had, through the Entomologists of the Academy of Natural Sciences an investigation made of fruit vessels coming into the harbor of Philadelphia, for Yellow Fever infested mosquitoes.

Frequently epidemics break out in isolated rural communities for which there is no apparent cause, and for which the local physician cannot discover any definite reason. Such cases should be referred to the Health Department, the cause identified and the remedy applied. We all know that about the farm, building conditions exist which breed enormous numbers of unnecessary flies and mosquitoes. Rational hygiene demands the removal of these conditions and the extermination of flies and mosquitoes as well as any other biting insects. We would, therefore, suggest that this Board assist the Health Department in its efforts to induce the farmer to create such hygienic conditions about his premises that infection and contagion of his own family cannot take place on his farm, nor of any of those who use his products, for if it is worth while fighting the San José Scale, it is certainly worth while creating healthy conditions about the barn and destroy breeding places for insects.

It was moved and seconded that the report be received, placed on file and printed. Agreed to.

The CHAIRMAN: We will now take up the Report of the Committee on Forestry, Mr. Irvin C. Williams, Chairman.

Mr. Williams presented and read his report as follows:

REPORT OF THE COMMITTEE ON FORESTRY.

BY I. C. WILLIAMS, ESQ., Deputy Commissioner of Forestry, Chairman.

Forestry in this Commonwealth is advancing by slow but sure strides. It is a rule of the Department that the work shall proceed no faster than public opinion will commend. For this reason a slow and steady growth, sure of its ground as it advances, is preferable, with no sudden innovation or unusual and spectacular effort.

The business of forest protection, preservation, and restoration in Pennsylvania is purely a business, dictated by the laws governing good business policy. The Commonwealth has committed herself to this work and from it there can be and ought to be no retreat. The necessity for forest preservation is as urgent as ever, with the added idea that it is a necessity becoming more accentuated year by year.

It is foreign to the purpose of this report to dwell much upon the increasing scarcity of timber. This is a fact heretofore so frequently reported and so well driven home that it may pass as having been accepted by all persons who are at all familiar with the subject. The ideas intended to be conveyed relate to forest protection and forest restoration, with some added incidents, it being well understood that the reasons therefor are not dictated by sentiment alone but by that sound business policy already mentioned.

Since the rendering of the last report to your body, the purchase of wild lands for forestry purposes has been going on steadily. Not much is heard about it in the public prints, but the accretions to the forest reserves have grown so that the State will have within its control in a little while an aggregate area of about three-quarters of a million acres. These are to be set apart and devoted to the purposes for which the science of forestry stands in this Commonwealth.

The lands at present owned lie in twenty-three different counties. The larger bodies include about 56,000 acres in Pike and Monroe counties; 43,000 acres in Franklin and Adams counties; 250,000 in the central counties of the State, the remainder being scattered throughout the remaining counties. By far the larger part of the present holdings lies within the watershed of the Susquehanna River. Those in the northeastern corner drain into the Delaware, while only a small portion of those in the southern part of the State drain into the valley of the Potomac.

The same problem which confronted the administration of the forest reserves one year ago is still before it. This is the proper protection of the lands. It is gratifying to note, however, that the losses from fire are decreasing, and the report for the year 1905 is much better than for the preceding years. In the South Mountain reservation no fire occurred worthy of mention. Throughout the central reserves there were a number of small fires mostly set by the

railroads. By far the most destructive occurred in Pike and Monroe counties. The evidence at hand seems to point to the fact that these were either willful or malicious fires.

There is a class of citizens in this State living near the wild unseated lands which has been trained to believe, from long immunity, that it is privileged to help itself to whatsoever may be found on such land. This is nothing less than larceny; but long habit and freedom from molestation have taught them to feel that this is a right of which they ought not to be deprived. The Commonwealth, of course, prohibits and tries to prevent all such acts, and while some timber stealing is going on, it is lessening in amount. Prosecutions followed by convictions with suitable penalties imposed and collected, have been the means of teaching a long needed salutary lesson.

By law the State is limited to the price of \$5.00 per acre in the purchase of lands for reservation purposes. It is probable that the average price paid has not been much in excess of \$2.00 per acre. The State has therefore nearly a million and a half dollars invested in forest reserves, which in due season will return an annual revenue greater than any rate of interest ordinarily paid in business circles for money invested. The difference between the business of forestry and any other business requiring capital is one of time only. From the latter returns are made at comparatively short periods while from the former they are received only after the expiration of a longer period of time. In addition to the money revenue, the State and its citizens will be the better off for the protection and augmentation of its water supply, the better regulation of stream flow, the furnishing right at home of large quantities of necessary wood products, in addition to affording a field for unskilled labor to those who live in the small settlements nearby.

Upon these forest reservations are found the head waters of numerous streams breaking forth in springs at times of great volume. This water, running down the declivities of the mountain side, if properly controlled and utilized, would be the means of furnishing to the industrial communities of the State an untold number of thousands of horse-power, either directly from the fall of the water or through the medium of electricity generated at suitable stations and conveyed where needed through proper conducting cables. And the fact further remains that one stream is not only capable of furnishing power from a single plant, but that plants may be duplicated throughout its course and the water used over and over again in its passage from the higher to the lower level; and be it further noted that in thus utilizing the fall of the water it is in no wise contaminated or made unfit for personal or animal use. We confidently look forward to the time when such use may be made of the streams and small rivers which are wholly upon State holdings; for in these cases neither riparian or any other vested rights will be interfered with or even encroached upon.

The problem of pure water for domestic use is becoming one of greater moment every year. The phenomenal growth of manufacturing industries, naturally located near the streams, the increase of population about such centres and the use of the water courses for drainage purposes, all combined, make the problem of pure water supply frequently one not easy of solution. To enable incorporated

municipalities to supply their citizens from a source not subject to contamination, and where a copious flow can at all times be had, the Legislature of 1905 passed an act whereby the Forestry Commissioner and the Reservation Commission may, under such restrictions and regulations as they shall deem to be for the best interests of the public, grant to municipal corporations the right to take and use water from the streams upon the State forest reservations. A few of the municipalities in the State are at this time considering the advantages of this law. No doubt others will, from time to time, be compelled to look in this direction.

The same Legislature, feeling that the withdrawal of the State forest reserves from taxation was in many instances working a hardship upon townships thinly settled and having little seated land, passed an act whereby the State is required to pay those townships five cents per acre for each acre of forest reserve so held, apportioned between the school authorities on the one hand at three cents per acre and the road authorities on the other at two cents per acre. It is no doubt just that the State should help to bear the burden in all communities where it enjoys these holdings. The amount needed for road construction is not decreased but the purchase of reserves continues to withdraw further areas from taxation. The amount required for school purposes by reason of increased population is increasing. To withdraw the reserves from taxation is simply to compel the remaining owners of lands to bear the whole burden. Whether the arbitrary amount of five cents per acre, apportioned as above, is just to the State and to the other districts, is one open to discussion. It is the thought of many that the State lands should not escape without contributing their share, but that this share ought not to be more than the lands formerly paid when in the hands of private owners.

A class of legislation especially valuable to farmers and those owning large areas of timber land, is that which allows a rebate of taxes for maintaining the lands with a forest cover. Why our agriculturists are so slow to take advantage of these laws is a fact not explainable. While it may be attributed to lack of information on their part that there is such a privilege accorded them, it is true that some persons in some of the counties have taken advantage of or are about to take advantage of this legislation, and a more general interest on the part of those who know of these laws would surely bring them to the notice of others who may not be familiar with their provisions. The difficulty seems to be not so much with the people unacquainted with the legislation as with the officers whom they elect to carry on the public business of their counties, and who refuse to allow these privileges by taking refuge behind some obscure idea of unconstitutional legislation. They compel those seeking these benefits to resort to legal action in order to procure the rights and privileges plainly indicated in the body of the law, and upon which successive Legislatures of this State have been only too glad to set the stamp of their approval. A notable point in question is cited in a letter recently received by the Commissioner of Forestry from a prominent citizen in one of the richest agricultural counties in the State. It reads as follows:

"I have about 65 acres of timber and sprout land that is better than the law requires, and did have the assessor, as required by law,

to go through the timber. After having the assessor see the timber, I went to the Commissioners and they could say nothing before seeing their counsel. On going there the third time they sent me to the collector and he said he is unable to do anything in that line before seeing the Commissioners. Upon seeing them they told him to notify me to pay all of my tax on the timber of which I claim a portion according to law. As I am the next to heaviest taxpayer in ——— township, I do not want to pay more than required by law. There are ten acres of the timber heavy enough to cut, twenty acres over eight inches, and forty-seven sprout cut in 1896. Now I would like to know who shall pay the rebate and what shall be done next?"

Is it any wonder that men who are engrossed with the details of their business, or who do not have time or money to conduct lawsuits to compel negligent or indifferent officials to do their duty, would rather submit to such treatment than be harassed otherwise, as it seems pretty certain they would be? Until the servants of the people learn that those who give them office expect them to do their full duty, and then proceed to do it, we may expect just such treatment as the kind shown. A principle of this government is, that the people rule and if those intrusted with authority are unwilling to obey the will of the people, they ought to be summarily ejected from the offices they so dishonorably fill, or else of very shame resign of their own volition.

When the Commonwealth was young and it became necessary to offer inducements to settlers to take up lands, no fault could be found with the law which fixed the price at twenty-six and two-third cents per acre for vacant land. But after the State was well settled and lands everywhere therein had greatly appreciated in value, it was little less than absurd to dispose of the State holdings at that price. The fact that the Forestry Department in buying back these same lands for reservation purposes was compelled to pay many times that amount was of itself sufficient reason for the passage of the act of March 28, 1905, providing that no other vacant lands shall be patented to an individual, unless the same be first submitted to the Forest Reservation Commission for it to determine whether or not said vacant land is suitable for forestry purposes; and if suitable, the Secretary of Internal Affairs is directed to convey to the Forestry Department without cost. If unsuited for this purpose, he shall sell the lands at such rate as may be determined by disinterested appraisement, thereby procuring for the State something near their real value.

In carrying on the forestry work for the best interests of the Commonwealth, and of course that means so as to produce for the State the best revenue and best results in other directions, it is necessary to have carefully selected and well trained men to whose charge the work may be intrusted. Since forestry is as truly a science as any other science, and needs special preparation to carry it on successfully, the Forest Academy at Mont Alto was established by the Legislature in 1903. At the present time 26 young men are pursuing their studies and looking forward to future employment upon the State reserves, as trained foresters. The course of instruction covers a period of three years and, in order to give you an intelligent idea of the studies therein pursued, the branches covered by the work of the fall term, concluding with the Christmas holidays of 1905, were

arithmetic, geometry, dendrology, botany, physics, bookkeeping, surveying, physical geography, German, chemistry, forestry, forest practice, forest accounts, cavalry and infantry drill. The students are selected by a competitive mental and physical examination. Only those are eligible to appointment who make a general average in this examination of at least 75 per cent., and no more than ten are appointed each year, unless there be vacancies. The number that we can accommodate at the academy is thirty, and the endeavor is to keep the classes filled to the limit. The academy at present is in charge of four instructors, and the first class of young men who are expected to be ready for real forestal work upon the reservations will leave in September, 1906. The academy is but little more than two years old, but it is working satisfactorily and has before it the promise of great future usefulness.

The forest reservations, held by the State in trust for the people, are the people's property, bought and paid for with their money, and it is proper that they should be accorded reasonable privileges thereon which do not conflict with the real purposes of forest preservation. To this end the Department invites the citizens of the Commonwealth to visit these reserves and camp upon them, to fish in their streams and to hunt over their hills and mountains, to enjoy them to the full as great wild, free, camping and outing grounds, where men and women, and children as well, may find health and recreation. All this is done, however, subject to reasonable rules which the Commission has formulated for the government of the reserves. These rules are as follows:

RULES FOR THE GOVERNMENT OF THE STATE FOREST RESERVATION LANDS.

(Adopted by Resolution of the State Forestry Reservation Commission, September 1, 1905.)

1. The game, fish, and forest laws of the State must not be violated.
2. Birds' nests must not be destroyed or in any other manner interfered with.
3. Open camp fires or other fires must not be made, except in a hole or pit one foot deep, encircling the pit so made by the earth taken out.
4. Every camp fire or other open fire must be absolutely extinguished before the last member of the party using it leaves the locality.
5. Lighted matches, cigars, cigarettes, or hot ashes from pipes must not be thrown upon the ground. In every case they must be allowed to burn out or be otherwise extinguished.
6. Living trees must not be cut down or injured in any manner. Dead and down timber may be used for camp fires.
7. No person will be permitted to erect a camp who has not accepted in writing the camping rules and received a camping permit. When requested, every camping party, before selecting a camp site

or pitching a camp, must report to a forest officer on the Reservation, who will assign a suitable camp site within the region where it is desired to locate. No camping party shall consist of more than ten persons at one time. Permits will be granted for a period of two weeks only, but may be extended upon further application.

8. Every person receiving a camping permit must report to the Commissioner of Forestry at Harrisburg, any violation of law or of the rules for the government of the State Forest Reservation Lands coming under his observation.

9. No permanent camp or other permanent structure may be erected on the Reservation.

10. The pre-emption of any ground as a special camp site to the exclusion of others who may desire to camp near, and who have permission to camp on State Forest Reservation Lands, will not be permitted.

11. All persons who desire to picnic upon the State Forest Reservation Lands, remaining for a less time than a day, and not over night, are not regarded as campers and will not be required to procure a camping permit, but will be governed in all other respects by these rules.

12. During the open deer season in each year, no dog of any description shall be used for hunting purposes on the State Forest Reservation Lands, nor shall any such dog during that period be taken by hunters into camps on said lands.

13. The making of fires by hunters who stand on deer or other "runways" is forbidden.

14. The placing of advertisements on the State Forest Reservation Lands is prohibited.

15. Superintendents, wardens, detectives and all other Reservation employes are required to remove immediately from State Forest Reservation Lands all persons who take deer running dogs thereon, and to kill the dogs when found in pursuit of deer. They are also required to remove therefrom all persons who do not properly guard their camp or other fires so as to prevent destruction of State property by the starting of general forest fires, and campers who do not have proper camping permits.

16. All persons who desire to camp upon the State Forest Reservation Lands must first apply to the Commissioner of Forestry. A blank application containing the rules for the government of campers will be forwarded to the applicant, who must sign and return the same to the Commissioner. If in proper form, in the absence of other objections, a permit will then be granted.

17. All grazing of horses, cattle, sheep, and hogs upon the State Forest Reservation Lands is prohibited, except under direction of the Commissioner of Forestry.

TAKE NOTICE THAT

Persons who violate the laws or any of the above rules will subject themselves to immediate arrest without warrant, to be dealt with according to law; and may be denied all future privileges of camping, hunting or fishing on the State Forest Reservation Lands.

All State Forest Reservation employes, without first procuring a warrant, are vested by act of Assembly with power to arrest on

view all persons detected by them in the act of trespassing upon forest or timber lands within the Commonwealth, under such circumstances as to warrant the reasonable suspicion that such persons have committed, are committing, or are about to commit some offense against any of the laws now enacted or hereafter to be enacted for the protection of forest and timber lands. They are likewise vested with similar powers of arrest in the case of offenses against these Rules, or for offenses committed against the laws for the protection of the fish and game found within the State Forest Reservations.

All constables are requested, in case fire occurs within their townships, to notify the constables of adjacent townships toward which the fire is traveling.

COMMISSIONER OF FORESTRY.

In addition to affording pleasant recreation grounds for those who are in the enjoyment of fair health, it becomes indeed more important that they should furnish a safe retreat to those who are suffering from what is known as the white man's plague, tuberculosis. A suitable location on the forest reservation removed miles and miles from the ordinary habitations of man, where pure, clean air carries healing to the diseased lungs, and pure, cold water refreshes the feverish tongue, is the ideal place for the establishment of sanatoria for the treatment of incipient tuberculosis. The Camp Sanatorium on the South Mountain is ideally located. It is not a menace to any man, and the patients therein find healing and comfort. The State can do no better humanitarian act than provide liberally for those unfortunates who must of necessity withdraw from the class of workers. Here, at little expense they are provided for, healed, and restored to their friends and families, ready again to take their place in the producing class. The Camp Sanatorium, since its establishment in January, 1903, has treated about 120 cases, and the results obtained from its meagre equipment and small capacity have been most marvelous. The ready support of the Legislature for a continuance of this work will produce results hitherto wholly unsuspected.

We must keep before us, however, the primary object of the forest reserves, providing new sources of lumber supply; affording a cover to lands unfit for anything else than tree growing; and preserving and regulating stream flow. The whole work can and will have an effect for good upon all the citizens of the State, especially when combined with its incidental features, that of furnishing health and recreation to thousands of people. Those who realize the good which can thus be accomplished should, and we believe will, accord the whole movement the support which it so well deserves.

MR. SCHWARZ: Mr. Chairman, I would like to ask Mr. Williams whether he can give any information as to how to start a black walnut grove.

MR. WILLIAMS: Mr. Chairman, in answer to the gentleman, I would state that in Clinton county in the fall of 1904, five hundred acres of ground was plowed up—all of this lies in a swale or low place in a marsh—after the ground was suitably prepared and whatever debris was on the ground, was burned on the ground, then these walnuts were planted at short distances apart in rows. The nuts

themselves were put in the ground, and allowed to remain there without any further attention whatever. In the spring of 1905, a large number of those walnuts have sprouted and are coming up, and giving every promise of making splendid trees. Possibly sixty per cent. of those planted were in that condition last spring. The walnut is a slow growing tree, and does not always sprout the first Spring after being put into the ground. The coming Spring we will look for a great many more that did not appear last Spring. I think we may probably count upon about eighty per cent. of those walnuts growing. In order to keep down the wild vine and bracken last summer at the proper season, the ground was sowed with buckwheat. The buckwheat grew so rapidly in that rich forest soil, that it simply crowded out the weeds which would have intruded. At this time the ground is almost bare of weeds, and it may not be necessary to give another sowing of buckwheat. Some of those walnuts are about thirty inches high, and are doing well, so far as I can tell, this being simply an experiment, and an endeavor to find out what the Department can do in this direction. We have great hope that this experiment may be successful.

On motion, duly seconded, it was ordered that the report be received, placed on file and printed.

MR. SCHWARZ: Mr. Chairman, I would like to ask the distance apart that the Department expects those walnut trees to grow.

MR. WILLIAMS: At first, until they reach a size large enough to shade the ground, we will probably let them grow at distances of three feet apart; then as the size of the tree increases, we will take out each second tree; that will make it about six feet. If we find that is satisfactory for producing proper timber, they will be allowed to remain; if not satisfactory, another tree will be taken out which will produce distances of about ten to twelve feet.

The CHAIRMAN: Our next report is by the Committee on Cereals and Cereal Crops, Mr. I. A. Eschbach, Milton, Pa.

Mr. Eschbach presented and read the report of the Committee as follows:

REPORT ON CEREALS AND CEREAL CROPS.

BY I. A. ESCHBACH, Chairman.

In entering upon a report of the Cereals and Cereal Crops of Pennsylvania, I deem it but appropriate to mention a few developments along the lines of agriculture in a general way. To persons unacquainted with Pennsylvania, they are liable to underrate her position and rank as an agricultural State. The fact that she stands

first among the states of the Union in the production of iron and coal and second in the value of her manufactured products, naturally leads to the conclusion that but little attention is given to agriculture. Instead of this being true, the thrift of the Pennsylvania farmer is proverbial, and the extent and variety of the crops grown in the Keystone State, gives her a very high rank as an agricultural State. The soil of all the counties west of the mountain ranges is of excellent quality, producing fine crops of grass for pasturage and hay, as well as large yields of the chief cereal crops grown in this latitude. The extreme northwestern part of the State possesses special advantages as a fruit-growing section. The leading farm industry in the northern tier of counties are dairying and stock-raising. The southeast section of the State or southern counties of the eastern border possess a climate adapted to the production of all the cereal crops and the immense milk-supply to meet the wants of the great city of Philadelphia, gives the milk dairy a very prominent place among the farmers of this section, and some of the finest equipped dairies to be found in America are located here.

As was said before, in the variety of crops grown in Pennsylvania, she stands prominent as one of the greatest in the Union in agricultural wealth, considering the area under cultivation. The handling of these cereal crops of Pennsylvania could not be accomplished under the old style of operation less than 50 years ago. Well does the writer recall a few back-breaking operations, such as using the sickle in some lodged rye, and swinging the cradle (not so comfortable a one as our dear mothers provided for their babes) but one that required all the muscle the young man could muster up, to swing and lay on swath the crops of wheat, rye, oats and buckwheat produced. Farmers to-day have become mechanics, and the more machinery we can use profitably the better the work, and the cheaper cereal crops can be raised. We have to-day the self-binder to harvest the large crops of wheat, oats, rye, buckwheat and clover seed, and we have the corn-harvester to cut and bind that heaviest of all crops. The corn and the corn husker is fast coming to the aid of the farmers in handling this immense cereal crop. Commercial fertilizers have also figured in aiding the farmers of the State to better crops, and better grades and more fertilizers are being used each year in raising most of the cereal crops of Pennsylvania. The farmers of Pennsylvania are recognizing the fact too, that increased yields per acre, is the profitable way to raise crops. Men of minds in the great cities are looking to the farms of our country for the wherewith to feed the millions of humanity who are flocking to the great business centers.

Agriculture lies deep at the foundation of things that relate to the material life of the world and its vast processes go forward like the movements of the heavenly constellations in silence.

The year of 1905 has been unprecedented in the amount produced in this great country of ours according to figures shown by report of Secretary Wilson. This country has never known such averages per acre, as we have had, and we all feel that the limit is not yet reached. The possibilities of an acre are yet unknown. The past season of 1905 will go down in history as one of prosperity to the farmers, and improvements along all lines, in farm buildings and labor-saving appliances are apparent.

CORN.

By correspondence, observation and reports as could be obtained, we have ascertained that the corn crop of the past year has been a record-breaker, surpassing the great crop of 1903, in which the average production per acre was 31.2 bushels, while the crop of 1905 exceeds that year over 11,000,000 bushels, and the average production according to report of Bureau of Statistics is shown to be 38.9 bushels, a yield exceeded only in Indiana and Illinois. Some crops are reported as having an average of 100 bushels shelled corn per acre, but we somewhat discredit such reports, but crops of 60 to 70 bushels are to be found. The value of the corn crop can hardly be estimated. The green corn used for feed; the thousands of tons siloed each year; the millions of bushels husked and cribbed to be fed out and converted into beef, pork and mutton and the amount of corn-stover for roughage, place this crop ahead of all the cereal crops of Pennsylvania for food value. The benefits to be derived from the breeding corn for seed is being tested among some of our progressive farmers, and we feel assured that good results will be shown, where properly carried out. I also call attention to quite an income some of our farmers have from the sale of dried or evaporated sweet corn, as well as sweet corn sold in ear near our larger towns and cities. It is in itself quite an industry and pays well for time and labor expended.

WHEAT.

The wheat crop of Pennsylvania was one of the largest ever known. While no exceptional yields are reported, the average yield was ahead of former years. The highest yield reported is 36 bushels per acre and the highest average yield 27 bushels per acre. From reports, I ascertain that the average for the State to be 17.1 bushels per acre, being higher than for many years. The wheat in our locality (that in the middle eastern section) developed a most perfect berry, and good average yields, so that while the prices have dropped about 20 cents per bushel from a year ago, farmers still have a good return from their wheat crop.

OATS.

The oats crop, being largely a weather crop, gave promise early in the growing season of an abundant yield, but heavy storms about the time of heading and filling in our section lodged it so that the yield was less when threshing time came, than was anticipated. While many crops averaged 50 bushels or more per acre, other crops only threshed 20 to 25 bushels. This crop is a good crop for us farmers to raise, as it fits in between a corn and a wheat crop, and being a crop that is quick in growth and can be placed on the market in about 90 days from time of sowing, is a profitable crop for the farmer to realize on. Commercial fertilizers are used to good advantage on the oats crop, increasing the yield of straw, as well as improving the quality of berry and give weight to the same. The average the past year was 36 bushels per acre or 8 bushels in excess of 1903.

RYE.

Rye is a somewhat neglected crop in Pennsylvania and should be given a more conspicuous place among the cereals on light lands. On bluffs and land of thin quality profitable crops can be grown. Rye will do well where wheat will not produce paying crops. The amount of straw produced by growing rye in excess of what wheat will produce, would amply repay the difference in the price per bushel, being in our section about 15 cents less for rye than for wheat, and rye straw is in great demand in our towns at almost fabulous prices. The feed value of the rye crop is worthy of consideration and will add to the money-makers on our Pennsylvania farms. The average last year was 17 bushels, worth 65 cents per bushel or \$3,826,-228 in the State.

BUCKWHEAT.

Buckwheat is also grown to some extent in our State, and proves to be a very profitable crop as it only occupies the land for a few months and fully covers the entire surface during the time it is growing. It proves to be valuable to keep land clean and ready to put in a crop of rye and thus keeps the land fully occupied on new land just cleared and on light gravelly soils it is a money-maker and the crop the past year was sold from the thresher in our section at 50 to 60 cents per bushel. The yield varies from 30 to 60 bushels per acre. The average yield in the State was 20 bushels. Total yield, 4,647,960 bushels, worth \$2,602,858.

CLOVER AND TIMOTHY SEEDS.

But our report would seem incomplete if we omit the seeds. Clover seed and timothy also figure in making up a grand total and adding to the income of the Pennsylvania farmer. The past season was not so favorable to the filling of the clover seed, but prices have fully made up for the less yield. Reports from our farmers are light yields, from one to four bushels per acre of good seed, and prices from \$7.00 to \$9.00 per bushel according to grade. It is worth the while for the Pennsylvania farmer to look after the growth of the clover plant for the money consideration as well as raising more clover for the purpose of improving our soils. We call attention to these seeds as being money-makers and also to raise rather than buy all our own seeds.

In the growing of the cereals of Pennsylvania, the farmer should have his eye turned to the grass crop as it is shown that the hay crop was worth as much as all the cereal crops combined. The hay crop for last year foots up almost fifty-five million dollars in this State. It is a money-maker, and in our rotation of crops, will find a place.

The outlook of the winter grain is at present rather favorable, but as no snow has yet covered it, the remainder of the winter may be more severe. The wheat crop was put in under good conditions, and the rather early sowing shows some depredations of the Hessian Fly. Sowing began in our middle eastern section about the 25th of August, and the earlier seeding has made quite a growth, while the Sowing began in our middle eastern section about 25th of August, and the earlier seeding has made quite a growth, while the later seeding suffered more from dry weather in the month of November. Altogether it has a favorable outlook.

The average crops of the past season have been good, in some cases, exceptionally good, and while prices have depreciated some from a year ago, we still have abundant reason to be thankful to the Great Giver of all good, that he has so abundantly blessed us in this grand old Keystone State. The fact that all cereal crops have shown such a decided increase over the years past, the question naturally suggests itself, What are the reasons?

First. We have had ideal weather conditions.

Second. Farmers are farming more intelligently, they have studied their business and the farmers' institutes, as they are being held are largely responsible for these great results, and should be encouraged in every way possible.

On motion, duly seconded, it was ordered that the report be received, filed and printed.

The CHAIRMAN: Our next on the program is on the subject of the "Care and Handling of Farm Animals," by Dr. E. E. Tower, Hop Bottom, Pa.

Dr. Tower presented his paper which is as follows:

CARE AND HANDLING OF FARM ANIMALS.

BY DR. E. E. TOWER, Hop Bottom, Pa.

I come before you at this time to take the part of one of the most important branches of agriculture and one, in my opinion, most neglected, namely: The Care and Handling of Farm Animals.

In our State of Pennsylvania, we have invested something over one hundred and fifty millions of dollars in live stock. Now if by some means we can increase the value of each animal to the amount of one dollar, or occasionally save the life or usefulness of an animal, the gain would be no small amount. This can be done, and in a majority of cases far more, and by a little closer observation of the so-called little things in everyday life. It is the little things to which I wish to call the attention of my fellow Institute Workers at this time.

I am aware of the fact that you all, like myself, have your specialties, and that no one man can be a specialist in all branches; but there are a few little things that can be thrown in incidentally that may be the means of saving the life of a valuable animal.

First, I will take the dairy. The common disease known as "Milk Fever," a disease that a few years ago was considered incurable and only an occasional cow recovered that had the disease. To-day, nearly every case can be cured and without the aid of a Veterinarian. The treatment is simply to inject sterilized air into the udder. No medicine is used. The instrument for performing this simple operation can be bought for \$2.50, and no dairyman should be without one. It is quite common for the farmer to think there is no medicine in air or wind, and in some cases there is not. The air must be

sterilized in this case to free it from germs and impurities. Figuratively speaking of "wind" as a medicine to which the farmer has too often been made a victim, it must be thoroughly sterilized to free it from foggism and whims.

In the treatment of milk fever, as above stated, there should be no medicine given, for in a majority of cases the animal is unable to swallow, and should medicine be given it would be quite liable to enter the lungs and produce a pneumonia from which the animal may die.

A few years ago we were told of a disease called "Hollow Horn" and the horns were bored with a gimlet, and salt, pepper, vinegar and various other ingredients were inserted into the horns. The tail was also split and the same applications made in the incision and the animal was then supposed to be cured. To-day there is a marked tendency to de-horn cattle and we do not hear so much about the disease and it is now known that all cattle are liable to have hollow horns.

A few days ago a young man, who is a graduate of our State College, called me up on the 'phone and said that he had a valuable cow that had lost her "cud" and asked me what he should do for her. I explained to the young man that it was no more of a disease to have a cow loose her quid than it would be for a man to accidentally loose his. If this had occurred fifty years ago we would not have thought it strange; but at this enlightened age of the world it seems strange that a young man could graduate from the dairy department of our State College without being enlightened on subjects of this kind.

The subject of tuberculosis is one which is sure to come up at nearly every Institute, and while this is a deep subject and one which would necessarily be referred to a specialist, there are some things which you can all say to the anxious farmer who fears that he may have this dreaded disease in his herd.

A disease so varied in its attacks must have a very great variety of symptoms; but you can safely say to the farmer that any symptoms of decline in flesh, shrinkage of milk, cough or any other symptoms out of the ordinary, while the animal continues to eat well may be regarded as suspicious and the animal exhibiting such symptoms should be taken away from the rest of the herd until a correct diagnosis can be made. If this plan could be carried out, a great many of our valuable animals could be saved, for if animals affected with tuberculosis are permitted to remain with other animals it is certain to spread and it is in this way that infection becomes so extensive in some of our herds.

The farmer should be cautious in buying recruits for his herd. It is estimated that eight out of every ten cases of infected herds from cattle that were supposed to be healthy when purchased and before any physical symptoms could be seen the herd had become extensively infected.

Among the chief influences governing the spread of tuberculosis in a herd are stable management and stable construction. Hence we can all see the necessity of keeping our stables well lighted and ventilated. It is a fact that a majority of our stables are not as well lighted as they should be. The value of light is determined by several specific facts, viz: First, it has a decided germicidal action;

second, it increases the resistance of animals from attacks of tubercle bacilli, and third, it favors cleanliness.

It is a common sense matter of observation that dark, gloomy stables are invariably dirty while light and well ventilated stables are most always clean. It is a very poor farmer who will permit dirt where it can be seen, and in my experience, a farmer who has stables that are well lighted also enforces cleanliness. The two go hand in hand.

An ample supply of fresh air is desirable for three reasons: It has a depressing influence on germ life, it increases the resisting powers of the animal and dilutes atmospheric impurities, at the same time removing them. Where ventilation is bad, whatever impurities enter the air in a stable they are in a comparatively concentrated state and are therefore manifestly more dangerous than when segregated and dissolved by an abundant supply of fresh air that is in circulation by reason of a good system of ventilation.

The hygienic value of cleanliness in a stable cannot be overestimated for the reason that practical sanitary science is largely made up of cleanliness. Exercise is also essential to perfect health. It is a proven fact that the proper moderate use of any organ of the body maintains it in health and that disuse leads to atrophy. I am aware that some of our official publications and a few of our institute workers advise us not to exercise our cows. Common sense and the laws of Nature do not sustain the theory. Take for example the fish in the Mammoth Cave, Kentucky. They are blind. Originally these fish were possessed with normal eyes, as there remains a cicatrice of sufficient proportions to show their primal condition. For thousands of years they have had no opportunity of using their organs of vision and Nature has gradually eliminated that important function. This is also true of deep sea fish and deep sea life.

A great deal has been said about the tuberculin test and I regret to say that some of our leading agricultural papers have discouraged its use in a herd, reasoning that it is not reliable and that it may give an animal tuberculosis if it did not already have the disease. As a matter of fact, tuberculin contains no germs either living or dead and the disease cannot therefore be produced in that way. While we do not claim the tuberculin test to be infallible, we do maintain that is the best method we know of, and if properly used there will be little trouble, if any.

There is another disease known as "Anthrax" which is of considerable importance to farmers from the fact that it is extremely contagious to both man and beast, and is almost invariably fatal. This disease usually occurs in cattle over two years of age and runs a very rapid course, causing death in a very few hours. The symptoms are a discharge of blood from the nose or mouth immediately before or soon after death. The contagion is from this discharge and the "Anthrax" germ lives in the soil for an indefinite length of time. Sunlight and drying will destroy the germ; but a temperature of forty degrees below zero has no effect on it. All animals dying with this disease should be burned on the ground where they died if possible, thus disinfecting the ground and at the same time destroying the body. The one important thing to remember is that the animal should not be skinned, as it is in this way that man may

be infected, and also that the hide may cause the distribution of the disease. The farmer should therefore be instructed to burn all animals that die from any unknown cause, for by so doing serious outbreaks of some contagious disease may be prevented.

Another disease known as "Black Leg" is one which the farmer should know more about. This is a disease of young cattle usually occurring between the ages of six months to two years. Like Anthrax it runs a very rapid course. Death ensues in from twelve to twenty-four hours. The symptoms of this disease vary somewhat from those of Anthrax. There will be noticed a puffed appearance on the hip or shoulder and the animal will be lame in the quarter affected. If the hand is passed over the affected part it will be found that there is gas underneath the skin. If punctured where affected a dark bloody, frothy discharge ensues, and to a man not familiar with the disease, would apparently indicate a bruise. This germ also thrives in the soil, consequently all carcasses of animals dying from this disease should be burned on the spot if possible. Thus far we know of no treatment that is effective in these two diseases, "Black Leg" and "Anthrax." Our State Live Stock Sanitary Board prepares a vaccine which, if properly used, will prevent other cattle, that have been exposed, from taking the disease.

This is of great importance to the stock owner, and if our Institute lecturers will bear this in mind and use five minutes of the time in which they have been accustomed to inform the farmer how to use lime and buy commercial fertilizer, in explaining this disease, I think the time would be profitably spent.

Let us turn our attention for a few moments to the horse and see if there is not something that can be done to better his condition. There are a number of good stables in Pennsylvania; but there is not one but what could be made better, and by improving stables we add value to our horses. There can be no doubt that the proper ventilation of our stables has a marked influence in determining the health and vigor of the animals confined therein. It should always be borne in mind that the breathing of pure air is absolutely necessary for the existence of both man and beast, and in proportion to the purity of the air in which the animal is stabled, will be found the greater or lesser vigor and health and the consequent working of all the organs of the body. The effect of several horses confined in a closed stable is to impoison the air, and yet, even at the present day, there are too many who carefully close every aperture by which a breath of fresh air can in no way gain admission. What of necessity must be the inevitable result? The breathing of every animal contaminates and vitiates the air, and when, in the course of the night, this foul and impure air passes again and again through the lungs, the blood cannot undergo its proper and natural change. The result is impaired digestion, the brain and nervous system will suffer and all the functions of the body will be more or less disturbed, and one need not be surprised at finding sore throat, inflamed lungs, diseased eyes, mange and perhaps glanders in cases where such conditions exist.

When disease begins to appear among the inhabitants of these unventilated stables, it is no wonder that it should spread. When influenza breaks out in the Spring or Autumn it is, in very many cases, easy to trace it to one of these pest stables, and, moreover, it

is particularly fatal in such places. Horses stabled in small numbers, that are rationally treated, have it comparatively seldom, and usually in a mild form.

The temperature of a stable is an important consideration. It should not exceed 70 degrees F. in the Summer season or fall below 40 degrees F. in the Winter. The temperature can be readily ascertained by a thermometer which no establishment should be without. In some instances a horse is kept in a poorly ventilated stable, and stands in this unnatural vapor for eighteen or twenty hours and is then suddenly stripped of all his clothing, led into the open air and there kept for two hours or more when the temperature is from 15 to 20 degrees below that of the stable. Putting the inhumanity of this out of the question, does it not stand to reason that an animal thus unnaturally and absurdly treated is subjected to excellent opportunities for the contraction of catarrh, rheumatism and various other diseases? It is not generally known, but should be understood, that the return to a warm stable is as dangerous as the change from a heated atmosphere to a cold and biting air. It is the sudden change of temperature, whether from heat to cold or the opposite that causes the mischief and yearly destroys thousands of horses.

The matter of light in a stable has been referred to in connection with the dairy stable and will apply with equal force to the horse stable. A large majority of our stables are foul and unhealthy, and the foulness and unhealthiness is invariably caused by darkness; whereas, if stables were properly lighted, dirt and foul matter would be seen and their accumulation prevented. As it is, both in cities and in the country, darkness covers a multitude of sins, even in establishments that are well ordered otherwise.

There can be no doubt that many a good horse has been made totally blind by being kept in a dark gloomy stall. The eye is a delicate structure, and when an animal, kept in a dark place, is suddenly taken out into a bright light, an inflammation is produced which often ends in the loss of sight. In case of sickness great care should be taken to make the stable comfortable and pleasant. Give plenty of fresh air and avoid draughts. Give cool fresh water in small quantities and often.

It is a common practice in some stables, in case of distemper, to burn old leather or some other malodorous substance and compel the afflicted animal to inhale the smoke. This is exceedingly wrong and is productive of great harm. If you wish to test the virtues of such treatment, try it yourself. In place of the injurious smoke, take a pail of wheat bran, turn boiling water over it and allow the horse to inhale the steam or vapor which arises. You will soon find that he will not resist this as he naturally does the smoke.

If it is necessary to give medicine, great care should be taken in its administration. Never tie or pull a horse's head up or seize the tongue and pull it out to make an animal swallow, nor what is still worse, never pour medicine into a horse's nose, as by these methods the medicine is very apt to reach the lungs and produce serious results. Simply elevate the horse's nose slightly by placing the hand under his chin and administer a small amount at a time, allowing the animal time to swallow.

In the absence of a veterinary, never give medicine unless you

know exactly what its actions and uses are. There are a great many good horses killed by giving over-doses and poisons by persons unaware of the ingredients of the medicine given.

I would strongly condemn the use of aconite for the purpose in which it is commonly used by the layman or non-professional. It is a fact that this drug kills ten horses where it cures one, and if it could be kept from the men who do their own doctoring, the lives of many horses would be saved annually.

It is quite common to see men collect around a horse that has been taken sick on the road, and in all sincerity and honesty suggest a remedy which the speaker thinks cured his horse. The owner of the suffering animal, agitated and anxious to save his horse, takes the advice so freely offered and obtains the medicine as soon as possible and gives it to the animal. Soon another bystander exclaims, "I do not think the horse is troubled with the colic," and after venting his opinion, suggests a different medicine which he thinks is a specific. This is also obtained and administered, and so it goes until the horse is filled with all the drugs that can be obtained and he either expires, having been killed by kindness, or else lives on in spite of the wholesale treatment, showing that his constitution is stronger than the combined drug store in his stomach.

A story is told of a boy who, while on his way to school, saw a man doctoring a sick horse. The boy halted and after looking on for a few minutes said, "Pap had a sick horse and he gave him a pint of turpentine." Nothing more was said, and the boy went on his way to the house of learning. On his return he stopped to see how the sick horse was getting on, and the man said to him, "My boy, you said your pa gave his horse a pint of turpentine. I gave mine a pint of turpentine and he died." The boy replied very coolly, "Pap's did too." This illustrates what is oftentimes done without forethought of what dire results may follow.

Kindness to farm animals is a subject which should be taught in our schools and also in our homes. Standing before you as an advocate of the lower races, I declare—what I believe cannot be gainsaid—that just as soon and so far as we pour into all our schools the songs, poems and literature setting forth mercy and kindness to these dumb beasts, just so soon and so far shall we reach the roots, not only of cruelty, but of crime as well.

Mr. Angell in his address at New Orleans said: "We long ago found that the great remedy for all these wrongs lies, not in the laws and prosecuting officers, but in the public and private schools; that a thousand cases of cruelty can be prevented by kind words and humane education, for everyone that can be prevented by prosecution."

How many know what kindness to a horse means? It means a better horse, a better owner or driver. It shows in a sleek glossy coat. It means a thrifty condition. It produces one-third more work with the same amount of feed. It creates a friendship and a mutual confidence which, in cases of accident or emergencies, has often been the means of saving human life.

It was moved and seconded that the report be received, placed on file and printed. Agreed to.

MR. HUTCHISON: Mr. Chairman, while Prof. Shaw is coming forward, I would like to make a motion. I move that a vote of

thanks be returned to all these Specialists and others who have prepared and presented papers; also that a vote of thanks be returned by the Board to the Hon. James M. Shumaker, Superintendent of Public Grounds and Buildings, and for fixing up this room for us, and arranging it as a place of meeting.

The motion being seconded, it was agreed to unanimously.

The CHAIRMAN: We shall now have the pleasure of hearing from Prof. Thomas Shaw, of Minnesota, his subject being, "Feeding Farm Animals."

PROF. SHAW: Mr. Chairman and Members of the Board of Agriculture and Ladies and Gentlemen: If I understood the last speaker right, he said that the value of live stock had declined somewhat during recent years. You remember, those of you who were here yesterday, that I made the statement that there was a direct relation between the amount of live stock kept on the farms of the country and a profit that may be derived from those farms, so that I hope, whatever may be the cause that produced such a statement, that those causes may be speedily removed. I was cheered, however, by the statement made by another speaker a short time previously. If I heard him correctly, he said that the hay crop in the State of Pennsylvania was its most valuable crop. There is a close relation, as you all know, between the growing of hay and the growing of live stock, as well as between the growing of grass and the growing of live stock. I do not think that that could be said of many states of this Union, that the hay crop is worth more in money value than any other crop of the State, and I take it, sir, as an augury for good; I take it as one of the most hopeful indications in regard to the future of this State, that such is the fact.

Now, according to the program, I was to talk to you about the subject of feeding animals on the farm. I have been in Pennsylvania only about two days, and I am not going to tell you intelligent farmers in Pennsylvania how you ought to feed your stock, for you know better than I; but with your permission I will try to do this: I will try to talk about some of the principles that must be observed in feeding live stock, and if I give those principles correctly, it will lie with you farmers to take those principles and apply them in doing the work on your farms.

The following is Prof. Shaw's address:

FEEDING FARM ANIMALS.

BY THOMAS SHAW, Professor of Animal Husbandry, University of Minnesota, St. Paul, Minn.

The successful feeding of farm animals is never the result of accident. It is the outcome of giving food and care more or less in conformity with the leading principles that govern such work. The measure of the success will be the measure of the fidelity with which these principles have been observed. True, the individual

who thus succeeds may not be able to formulate those principles, but he unconsciously follows them all the same, or success would not crown his efforts. In the absence of formulated principles, the individual must learn from the experience of some one else; in their presence he has a safe guide, in the absence of experience, although experience is necessary to enable him to apply them in the most successful manner.

The following are chief among the leading principles that govern the successful rearing and feeding of farm animals:

LEADING PRINCIPLES.

1. They must possess quality before they can be fed and reared with marked success.
2. More food is required to make a given gain as the birth period is receded from.
3. When periods of stagnation occur before maturity, the food of maintenance, fed during such periods, brings little or no return.
4. When development is seriously arrested at any period before its completion, the feeding quality of the animal is affected adversely.
5. When development is unduly forced by stimulating foods while the animal is young, its feeding qualities are injured.
6. In the fattening process, when animals are so ripened that they crave to make good gains, further feeding can only be done at a loss.
7. In selecting a ration for feeding, a due regard must be had to the chemical constituents of the food or foods which compose it.
8. In nearly all instances a mixed diet is superior to one composed of any one food.
9. In fattening animals the profit or loss resulting is largely influenced by the cost of the animals up to the time when the fattening begins.
10. Pregnant animals should be maintained in a good condition of flesh.
11. When animals are exposed to temperatures below what is normal, additional food, proportioned to the degree of the exposure, will be necessary to restore animal heat.
12. Discomfort from any sort arrests development, and consequently, produces loss in proportion to the degree and continuity of the same.

QUALITY IN FARM ANIMALS.

Quality when applied to farm animals is comprehensive or otherwise as the term is defined. More commonly it has reference to handling the skin and flesh, especially of cattle. When thus applied it has reference mainly to the sensation conveyed to the mind through the sense of touch. Its presence is usually sought by touching certain portions of the body with the finger-tips to ascertain the depth of the covering, and by grasping the skin over the ribs within the hand to ascertain its looseness and flexibility. A good depth of elastic flesh relatively over the portions that are more difficult to cover, as the loin and shoulder-blade, and loose pliant skin are indicative of good digestive qualities, as they are the outcome of these.

As used here, however, quality is used in a wider sense, that is to say in the sense of capacity for well-doing as indicated by the breeding and form in addition to the handling. The breeding of animals has of course an important influence on their feeding qualities. As a rule, well-chosen, pure bred animals of the beef breeds will make greater gains and more rapid gains from a given amount of food than will common stocks of mixed and inferior breeding, or than animals of the various dairy breeds. This statement has been denied, and some of the experiments conducted by the experiment stations would seem to favor such denial. Other experiments tend to sustain the opposite view. Of the correctness of the stand taken, however, I have not the shadow of a doubt. Good digestive and assimilative qualities are as much a matter of transmission as qualities or properties that relate to form.

The possession of correct form is, of course, immensely important. The precise nature of such form will be largely dependent on the precise object for which the animals are reared. In meat-making animals it usually means much relative width and depth, and fore and hind quarters well-balanced as to weight. In milk-giving animals it means much capacity of barrel and various other accompaniments which cannot be mentioned here.

The difference in capacity of animals similar in age, breeding and form, to digest and assimilate food, is very great. It varies in some instances between 50 and 100 per cent. One steer being fattened will sometimes gain but little more than one pound a day, whereas another steer will gain two pounds per day on practically the same food. But the difference in returns in meat-making animals as the result of form is no less great. One cattle beast possessed of correct form will sell for 5 cents per pound alive, when another fed for as long a period will only sell for three cents, the difference being based entirely, or almost entirely, on form.

COST INCREASES WITH ADVANCE IN AGE.

As a rule, the amount of food required to make a pound of gain in meat-making animals increases as the birth period is receded from, and increase in weight decreases continuously.

It is easily possible to make a cattle beast of beef inheritance gain two pounds daily during the first year not including birth weight, even though reared essentially on skim-milk and adjuncts during the milk period. The same animal is not likely to increase in weight the second year more rapidly than one and a half pounds per day, or the third year more rapidly than one and a quarter pounds per day, notwithstanding that more food was consumed the second year than the first, and the third year than the second. The explanation is found in the greater activity of the digestive organs near the birth period, and to the increase in the cost of the food of maintenance as the birth period is receded from. Young swine furnish an exception to the rule regarding increase in weight but not in regard to increase in the food required to make weight. Young swine while nursing cannot be made to gain so rapidly as at a later period.

The economy of pushing our meat-making animals rapidly from birth until ready for the block will be readily apparent. The importance of so doing increases with relative increase in the cost of

food. It may be different where, at certain seasons of the year, cheap and coarse foods are abundant on the farm, and it is desired to utilize them to the utmost, or where pastures are partly or wholly free as on the range. It may be that a steer grown on the range will bring greatest profit sold at four years. It may be also that a steer grown on farms in the Mississippi basin, where, oftentimes, much fodder is wasted, will bring greatest profit at three years, but in the Eastern and New England states, greater profits will certainly come from selling steers finished at an age not exceeding two years, where food is relatively dear.

CESSATION IN GROWTH.

The truth must be self-evident, that if at anytime before development is completed growth ceases in whole or in part, the cost of the food of maintenance is proportionately increased. If cessation in growth is complete, there is no return for the food of maintenance during its continuance, unless it be under conditions where animals are thus carried on until they can be maintained on cheaper foods. For instance, it may pay a ranchman to carry an animal through the Winter without gain in order to bring it to that season when it will graze on pastures that cost but little or are entirely free. But it will not pay the eastern farmer thus to carry a young animal through the winter, since pastures on eastern farms are valuable as well as coarse foods.

The farmer who puts a young animal in winter-quarters at the advent of winter, and who turns the same out to graze, say five months hence, without any advance in weight, has virtually lost the food fed during those five months. The only return he has is a poor grade of fertilizer, the value of which will be largely offset by the labor expended in caring for the animal and the cost of providing suitable shelter. In growing meat-making animals, therefore, on eastern farms, the wisdom of keeping the animals growing all the while and with prudent haste, and of selling them at a relatively early age will be abundantly apparent.

ARRESTED DEVELOPMENT.

Should development be arrested in whole or in part at anytime before it is completed, the capacity for future development is weakened and in proportion to the degree to which development was hindered.

When the hindrance to development is slight and covers but a short period, the injury resulting may be so slight as to be imperceptible, notwithstanding, time is lost in completing development and there is also a proportionate loss in the food of maintenance. If the arrested development has been prolonged and severe, in addition to a proportionate delay in completed development and a proportionate loss in the food of maintenance, there will also be a proportionate loss in the capacity for future development. Feed the animal ever so well, subsequently, and it will never wholly regain what has been lost. In other words, the same profit can never again be made from growing the animal that would otherwise have been possible. If the arrested development has been exceedingly severe, then the loss of capacity to develop may be so great as to preclude

the possibility of making any profit from rearing the animal under any conditions however favorable. It should also be remembered that the loss of capacity for future development is greatest when arrested development occurs near the birth period, and gradually grows less as it is receded from. The importance, therefore, of keeping animals pushing on with a prudential haste from the day of birth until development is completed, or until they are ready for the block, cannot be easily overestimated.

Arrested development may arise, of course, from various sources. It may come from insufficient or unsuitable food, or food both insufficient and unsuitable, also from food excessive in supply and nutrition, or from under exposure, or from several of these, and it may be the other causes combined. It would be too much to claim that the source of arrested development did not influence the loss of capacity referred to, but it would not be claiming too much to say, that whatever the source; the loss in capacity to develop will be serious whenever prolonged periods of stagnation occur in the early growth of the animal. The unsatisfactory development, subsequently, of the ill-cared-for whey fed calf furnishes an illustration.

OVERFEEDING DURING GROWTH.

When food is feed exactly adapted to the needs of a young and growing animal, it would not be easily possible to injure the animal by overfeeding, but it would, of course, be easily possible to waste food through careless feeding. Exact adaptation has reference to feeding foods in due balance both with regard to chemical constituents and proper adjustment between the concentrated food fed and the roughage. With some foods, adaptation is so perfect that animals feeding upon them will not injure themselves and will at the same time make satisfactory development in the line sought. This is true of rich pastures grazed in summer and of clover and alfalfa hay fed in winter. Other foods fed at will may be seriously harmful, in fact, positively dangerous, while at the same time they are helpful when fed with due regulation. For instance, one feed of rye meal consumed at will may destroy a young animal, while a suitable amount fed from day to day with other food adjuncts would be decidedly helpful.

Injury from excessive feeding of meal to young animals most commonly occurs when they are less than one year old. During the milk period, young calves will seldom, if indeed ever, injure themselves by feeding, ever so freely, on a meal ration composed of ground oats and wheat bran fed in equal parts by weight, nor are they likely to injure themselves subsequently on such food with suitable fodder adjuncts. The reference here is to animals grown for meat. But a time comes when so much of the meal would be consumed that it is unprofitable to feed it longer at will. But suppose instead of the meal mentioned, corn was used, or rye, or a mixture of these, a time would come when development would be checked if not positively arrested. The too concentrated character of the food in conjunction with excessive amount fed has overtaxed the digestive and assimilative organs to the extent of weakening them, it may be permanently.

When the animals are being grown for milk production, the properties concerned in future milk production may be weakened by such feeding before the point has been reached when the digestive

organs become impaired. The injury may come from the influence which the food has exercised on assimilation. It has strengthened the digestive habit of utilizing the food in making fat and the influence in this direction is felt even after the female has begun to produce milk. It is possible, however, if not indeed probable, that this thought has been carried too far in the rearing of dairy heifers.

When animals are so forced during the finishing period by feeding so much strong meal that they get off their feed, that is lose appetite in whole or in part, the danger point has been reached. The digestion has been more or less impaired. Cessation in feeding the meal or the grain that has caused the trouble is the remedy. In many instances, however, subsequent gains will be less than they would have been had the digestion not been thus impaired.

It is also true that dairy cows under high-pressure feeding may have the milk-giving function weakened in the absence of any symptom of indigestion, resulting from sheer overwork. The machinery of digestion has been driven at a speed so high and so continuous, that the wear has been excessive, although there has been no breaking down in any part thereof. The limit of the period of high usefulness in a dairy cow may thus be easily and materially shortened.

SELL ANIMALS WHEN RIPE.

Animals that are being fed for the block are ripe when, under normal conditions of feeding, they cease to make material gains. If kept longer the larger portion of the food is given at a loss. The loss may soon become serious, for, under such conditions they may continue to consume large quantities of food. Such ripeness is indicated by a firmness of the flesh under gentle pressure or by marked falling off in the gains under suitable conditions of feeding. In an experiment conducted under my personal supervision, pork during the fattening period, was made up to a certain point at a cost of approximately four cents per pound, whereas during subsequent weeks the cost was approximately \$10 per 100 pounds, the food fed being the same in kind. The importance of disposing of animals promptly when finished is thus apparent.

The mistake, however, is far more frequently made of selling animals unfinished. Probably 90 per cent. of all the cattle sold reach the block under rather than overfinished. This more than anything else probably is accountable for the too common belief that there is no money in fattening cattle. Sometimes cattle are sold half finished because the price of food has become unduly high. At other times, because suitable food supplies cannot be obtained, but more frequently perhaps, because many do not properly understand what good finish in cattle means.

THE CHEMICAL CONSTITUENTS OF FOODS.

When foods are being fed, a due regard must be had to their chemical constituents, which means that a proper relation must obtain between the amount of protein and carbo-hydrates fed under normal conditions of feeding to insure the most satisfactory results. This relation will vary with the animals fed and the objects sought from feeding them. These varieties cannot be discussed, they are so many. There must also be a certain relation between the amount

of concentrates and roughage to bring highest profits. But since this relation is a shifting quantity and is to some extent affected by food values, it also will not be discussed further.

I call attention to the important fact here, that the real value of a food factor may be more or less in practical feeding than chemistry would assign to it on the basis of food constituents. Two factors at least must be considered in judging of the value of a food in addition to the chemical constituents which it contains: The first is palatability and the second is the influence exerted on the digestion. Thus, rye straw, because of its low palatability, has a lower food value than chemistry would assign to it. Animals will not eat it freely unless impelled to do so by hunger. On the other hand, field roots have a higher food value because they favorably influence the digestion.

The further fact is also significant, that in some instances, foods may be fed at a greater profit when fed out of balance rather than in balance. This is possible when one food is so much cheaper than another, opposite in character, that it may, as it were, be fed in excess. I have fattened lambs at greater profit on a ration not in balance than on one in balance, because of the relative cheapness of corn, a leading factor in the former. In alfalfa areas it also sometimes pays better to feed protein in some excess than to incur the cost of securing other foods to balance the ration.

A MIXED DIET SUPERIOR.

In feeding animals for a prolonged period, a mixed diet is superior to a ration composed of only one or two food factors. This may, to some extent, be owing to some chemical action which the foods exercise one upon the other in the process of digestion. It is probable, however, that it is due more to the influence exercised by the combined foods on the appetite and to the more even balance that is thus likely to be secured in the mixed diet. Animals, like individuals in the human family, tire of one kind of food when fed continuously upon it. To this there may be some few exceptions. They tire more quickly of some food factors than others. Swine, for instance, will consume corn for a longer period with a relish than barley or rye, and horses will consume oats with avidity for a longer period than any other kind of grain.

These influences are more noticeable when the feeding is forced, as when animals are ripening for the block. The appetite under such feeding slackens, hence any judicious change of diet that will lead them to consume more food will usually be found helpful.

INFLUENCES WHICH AFFECT PROFITS.

Among the many influences which affect the profits that result from feeding, but three will be discussed here, viz: The influence of food values, of cost before the fattening period, and of the price received for the animals when sold.

The influence of food values is so evident that it is scarcely necessary to discuss it. Other things being equal, the difference in returns from feeding corn at 20 cents per bushel and the same at 40 cents will be at once apparent. Some seasons the price of foods varies much. One kind of grain may be dear and another kind

cheap. All kinds of grain may be relatively dear, while fodders may be cheap. Under such conditions, the aim of course should be to feed the cheaper foods as far as may be judicious in the one instance, and to utilize fodders as far as may be practicable in the other. Sometimes, however, it may be advantageous to feed more or less of the dear food, because of the advantage which results from feeding foods in balance.

Where the conditions are normal it follows that, as a rule, foods may be more cheaply grown by the farmer than purchased, but it may, notwithstanding, be necessary to purchase more or less of one or more food factors not readily procurable from home sources in sufficient quantities. The grower may thus find it profitable to purchase wheat middlings freely, notwithstanding, that he may be a large grower of corn. It is also generally true that fodders are relatively cheaper than grains, hence the larger the amount of these that may be judiciously fed, the larger will be the profits. In this fact is found the justification for the free use of corn ensilage in feeding live stock and in chaffing and mixing dry fodders with meal, in order to increase the consumption of the former.

As a rule, a pound of increase made during the finishing period costs more than the food used in making it. To this there are some exceptions, as when meat brings a good price while the foods used in making it are cheap. If, therefore, profit is to be made on home raised animals fattened on the farm, it must come from the two following sources, viz: The growing of the animals on cheap foods up to the time when the fattening begins, and the increase in value on every pound of live weight possessed by the animal at that time resulting from the fattening process. The profit of the feeder who buys the animals which he feeds can only come, of course, from the last named source.

Suppose, for instance, that a feeder purchases a steer at four cents a pound live weight, feeds him for six months and sells him for five cents a pound. Suppose the weight when purchased was 1,200 pounds and when sold 1,500 pounds, the gain being 300 pounds. Now, suppose the 300 pounds cost \$15 to make it, then no profit has been made on the increase in weight. The profit comes from the advance of one cent per pound in the value of each of the 1,200 pounds of weight possessed by the animal when the feeding began, that is to say, it would be \$12, leaving the value of the manure to offset the labor and interest on the investment.

The close relation, therefore, between buying and selling prices in animals that have been fattened is very apparent. The difference between the buying and selling price, as a rule, should not be less than one cent per pound, if any considerable profit is to come to the feeder. Before substantial profits can be assured, this difference should be from one and one-fourth to one and one-half cents per pound.

At first thought it may be imagined that, since profit in feeding comes from the increase in value in the weight possessed by the animal at the time of purchase, the more the animal weighs at that time the greater will be the profit resulting from fattening. In many instances that does not follow, since young animals considerably below maturity make greater increase for the food fed to them.

GOOD CONDITION AND PREGNANCY.

The fallacy so extensively believed that pregnant animals should be kept in moderately low flesh has done much harm. It is of course quite possible to keep a pregnant dam in a condition of flesh too high for the well-being of the progeny, but the instances in which this occurs are few indeed compared with those in which the opposite is true.

The pregnant animal, while in this condition, must maintain herself and also nourish the foetus which she carries. The double duty thus present calls for liberal feeding. Where this is not forthcoming, the foetus is sustained in part at least at the expense of a lowered condition of flesh in the animal. This of course reduces the ability of the dam to properly nourish the offspring after birth.

After the young animal has been born, the drain upon the dam for its sustenance is usually heavy. To meet this need, the tax upon the system of the dam usually lowers her flesh though liberally fed. It follows, therefore, that a dam in good condition when her offspring are born can nourish them better than one in low condition. The former has stored up flesh previously which is now drawn upon to feed the offspring.

COMFORTABLE HOUSING.

Animals that are being fattened must be protected from excessive cold or the cost of food in proportion to the gains made will be materially increased. It is probable, nevertheless, that more loss results from keeping animals too warm and closely confined while being fattened than from exposing them unduly to cold. Recent experiments have shown that animals fattened in sheds with liberty to move about in the same and also in yards adjacent, have brought higher profit than those tied in the stall. The former consumed more food, but they also made greater gains.

The degree of the exposure or of the protection that should be given varies with the class of the animal. Sheep, for instance, will bear more cold than cattle and cattle than swine, but it is imperative that all animals that are being fattened shall be protected from storms. Food is expensive heating material.

CONDITIONS OF COMFORT.

The feeder who attains to marked success in this line of work must study carefully the needs of the animals which he feeds. If the conditions prove too warm through change of weather, more ventilation should be promptly given. If they prove too cold, additional attention should be promptly given. If an animal gets off food, immediate attention must be given to its needs. The more completely comfortable that animal can be kept, the better will they flourish, and it will be the constant endeavor of the faithful stockman to make them comfortable. While engaged in such work, he can never come down from the watch-tower of vigilance, and his reward will be proportioned to the fidelity and intelligence which he has shown in his work.

Mr. Sexton, in answer to an inquiry of Prof. Shaw, made the statement that the soil of Pennsylvania does not produce a good

crop of Canada peas; he stated that in New York they raised from thirty to thirty-five bushels per acre, but not here.

PROF. SHAW: Mr. Chairman, I am here to say that if you can't make a success of growing Canada peas as a forage crop along with oats, you can't make a success of them in growing them separately.

A Member: Why grow peas on land where you can grow 65 to 75 bushels of corn to the acre. Would you do that?

PROF. SHAW: I would, under some conditions, because you can't grow the corn every year on that land; you must have protein, and I think you can grow it cheaper than you can buy it. Perhaps you think you can buy it more cheaply.

I would like to ask if there is anybody in the room who has grown alfalfa on their farms. If so, kindly hold up your hands.

Several stated that they had tried to grow alfalfa and failed.

MR. HUTCHISON: Have you ever had any experience in feeding alfalfa meal?

PROF. SHAW: I have not, personally, no. I imagine, though, that alfalfa meal would be all right if you haven't to pay too much for it.

MR. HUTCHISON: The trouble is to get the animals to eat a sufficient quantity of it.

PROF. SHAW: I do not think it would pay to feed alfalfa meal to anything only calves. I do not think it would pay to buy it to feed it to animals older than calves, young calves at that.

A Member: Would you expect the meal to be worth more than the alfalfa before it was ground?

PROF. SHAW: It would be only worth more in this respect; the grinding is a sort of mastication of the alfalfa, and it might be a little less indigestible; it would probably take a little more of it than it would of hay; a very young calf, I am speaking about now.

The SECRETARY: The labor of mastication would be saved, and of course that would be something, and the amount of feed after it was ground would be very much in its favor, wouldn't it?

PROF. SHAW: It would be somewhat, yes.

A Member: If a man was successful in raising clover to balance his corn, would you still advise him to spend his time trying to raise alfalfa, provided he had tried to raise alfalfa without success?

PROF. SHAW: I would, unless he had exhausted every reasonable method for raising alfalfa, for this reason, that alfalfa has some advantages over clover; it will produce more per annum as a rule and it will stay in the ground, or ought to stay in the ground for a number of years, and these are two important advantages it has over red clover.

MR. HUTCHISON: What experience have you had in inoculating soil?

PROF. SHAW: I will tell you one experience I had in Minnesota. I had an opportunity to do this, to show alfalfa on a piece of land on the first of May, and it grew fine. It was cut off a couple of times in order to cut the weeds along with the alfalfa, and as it was cut off, it was just allowed to lie on the ground in the form of a mush, to about the first of September; that alfalfa then began to pine, began to pine more and more as the autumn advanced. Then I began to conclude that that ground needed inoculation, and I said to the man, drive a couple of loads of our best farmyard manure across that field, and the manure was put on, and the next Spring that was the only part of that field in which the alfalfa was worth the cutting, and in the month of June where that alfalfa was, it was growing good and strong, and I found tubercles in abundance in that alfalfa, on the roots of the plants.

I do not think, gentlemen, I should detain you further in regard to this question, but I do regret that we cannot get our farmers to think more in regard to this thing than they do. I do not refer to the farmers who come to the State Board of Agriculture, or to Farmers' Institutes, but I do refer to that great mass of the farming community.

I was in the State of Indiana not long ago, and my heart was cheered by the fact that 1,100 farmers of that State had been persuaded to come out and spend a whole week to study questions pertaining to corn and livestock, and I did conclude that the possibility of bringing together such a meeting as that in one State argues well for the future in the dispersion of knowledge throughout the Commonwealth, and of lifting our farmers to a higher plane in these United States.

MR. HUTCHISON: I see in looking over our list of members, that the Hon. John A. Woodward's time expires this year, and he has not filed his credentials with the committee, but he has been always an active member in attending our meetings and taking part in our deliberations, and we all appreciate the work he has been doing for agriculture; and now without consulting him at all I would move that he be admitted as a member of the Board for the term of three years, and that he file with the Secretary his credentials from the Agricultural Society in Centre county.

Motion being seconded, and the question being put, it was agreed to.

MR. HERR: Mr. Chairman, it is the first case I have ever heard of where a man has been elected to membership in the Board of Agriculture when we don't know whether he desires it or not.

COL. WOODWARD: Mr. Chairman, I will state that the action taken was an absolute surprise to me, and the reason I had not presented my credentials, is that I hadn't thought of it, and as the Society had no meeting where the matter could be attended to, it was not done. I was unable to attend to any kind of business during a large portion of the year, and during the latter portion I have been extremely busy, and it escaped my attention entirely. I came here supposing my term had not expired, and did not know until my attention was called to it yesterday, that it had. I very much appreciate the implied compliment, but will not consider my-

self a member of the Board until my certificate is filed, which I have no doubt it will be in good time.

The CHAIRMAN: The thought ran through my mind, whether it would be in order to put this question, but considering that Col. Woodward had an Agricultural Society back of him, which would be sure to select him, I felt sure it would be all right. I do think that there are some things we should know as members of this State Board of Agriculture. There are quite a number of counties that do not send any representative here; whether they have agricultural societies that entitle them to have representation here, I do not know; I do not know how many of our members know. Another question that arises is, when credentials are sent in here, some of them are lacking a little in form; some of them are lacking the seal, and the Credential Committee in such cases, do not know exactly what to do. Probably some of these agricultural societies are not living up to the law and have not got the right to elect a member. Now I think it would be wise if we would take some action by which we can have our members elected from societies that are working under the law; and in counties that are not working under the law, I would like to see the right to elect members given to other counties that would elect members in accordance with the provisions of the law, so that we might have a full membership in this Board.

PROF. VAN NORMAN: Prof. Shaw has referred to a gathering of farmers at the Indiana Agricultural College for a week. Having been there for several years and knowing the magnificent increase of interest that has been developed there, the inquiry has run through my mind, Why can't we have a farmers' week at Pennsylvania State College? Do you want a week up there? A week in which we shall get such men as Prof. Shaw and other men who are specialists along dairying, horticultural, corn and beef lines, that are appropriate to the agricultural interests of the State, who shall supplement the work that is now being done, and give you a week of practical instruction when we can bring out the stores that we have and show you the dairy cows that we have there. I believe we can make a week there worth your while, and if you say you want it, we will do what we can to help bring it about. Now I put it up to you, Do you want it?

DR. FREAR: Mr. Chairman, I am very happy indeed to second the suggestion of Prof. Van Norman. I have recently come from a brief visit to Kentucky. I had a very pleasant day with my friend the Director of the Experiment Station in that State. He was full of the alfalfa and corn trains which are being sent over that State for the instruction of farmers. I asked him how the work was conducted. He said the train ran into a place and the people gathered and they stayed there for an hour or two, and then it ran on to another place. I had a talk a short time ago with Prof. Peterson and he told me of some of the experiences in that State, but he said, the trouble is, the time is too brief.

Now can't we help you? Do you wish to be helped to a practical presentation of what has been done and can be done by the men who have succeeded in carrying out some of the latest develop-

ments in these special branches of agriculture that are promising good results in Pennsylvania. If so, we shall be glad to do what we can to organize a week for you that will be profitable, inspiring and not only a help to you, but to many others.

COL. WOODWARD: Mr. Chairman, as a member of the Board of Trustees of the Pennsylvania State College, I wish to assure all my fellow-members of the Board, as the representatives of the faculties have already assured you, that the Board of Trustees will do everything in their power to make it a comfortable and profitable week for the farmers of Pennsylvania as soon as the necessary arrangements can be made.

MR. WELD: Mr. Chairman, just a few days ago I had a letter from a gentleman who is the director at the station in the territory of Oklahoma. He told me that they just got through with a farmers' gathering at Stillwater, Oklahoma, which had been very successful. I think if the territory of Oklahoma can do these things, the old Commonwealth of Pennsylvania ought to heartily second the suggestion that has been made by the experts of the faculty of the Pennsylvania State College.

The **SECRETARY:** I would like it if Prof. Van Norman would repeat his remarks or would state specifically what is contemplated to be done.

PROF. VAN NORMAN: Possibly I can best answer that by telling you what Indiana has done, to which Prof. Shaw referred when he stated that 1,100 farmers were over there at the College where they held a week's session for the farmers, and they came up there, and then they gave that time up to just such instruction as Prof. Shaw has given us here, straight through the week; then the same with corn as the topic. Then they supplemented that by using a portion of the time in the practical demonstration of what had been accomplished along certain definite lines, such as dairying and so on, where the steers or the dairy cattle are brought right in. Then in another place they had arranged there long tables, and each farmer is expected to become a student, and take a seat for instance to study the question of seed corn.

Now then, my inquiry was, Do you gentlemen want something of that kind in this State? I have been told that there are men growing corn in this State that are just as competent to show you correct methods and to make suggestions in regard to corn, as there are in Indiana or in any other state, and men who are interested in fruit, and those interested in the varieties in fruit, can sit down and study and talk over it for a week with a collection of men that you can't find anywhere else. Those of you who are interested in dairying, we will try to get together and we will exhibit the butter, and will bring the livestock out for examination. Iowa took three carloads of horses from Ohio for their farmers' week in order that the farmers interested in horses might have animals of the right kind to examine and judge. I do not hesitate to say, gentlemen, that lots of you have never seen steers such as Prof. Shaw has seen at the international livestock show.

If you will come up and see what we have there, I am sure it will be profitable to you. I believe that we have some animals there

that we need not be ashamed of, even if we have not got any of the prize Shorthorn animals. Minnesota last year had the grand champion of all; Indiana had the next, and Iowa got it this year. That shows that in the colleges there are men who can feed, who understand the principles of feeding, and I believe we can get some of those men to come and tell us how it is done, and the question is, Do you want them? If so, Prof. Frear and Col. Woodward will get together and we will all help all we can.

The CHAIRMAN: Is it the idea that we are now to consult our people and then determine this matter?

PROF. VAN NORMAN: Yes, or if you want to make some expressions of approval or disapproval, that will put you on record here.

The CHAIRMAN: You do not contemplate the Board taking any action at this time?

PROF. VAN NORMAN: That is up to the Board to do what they wish to do. You have the suggestion before you now.

COL. WOODWARD: This invitation is extended to the farmers of Pennsylvania, it will be understood, irrespective of whether they are members of the Board or not. It is simply intended, I judge, to send the invitation out to the farmers by their representatives here in this Board and that this meeting shall be a meeting of the actual farmers of Pennsylvania of all grades and classes and the expression sought by Prof. Van Norman, if you will allow me to interpret him, is the disposition of the farmers to have such a meeting at the college at some part of the year, at a time to be hereafter decided upon. There is nothing to be decided here today, excepting that that would be a good thing for all the farmers of Pennsylvania who can be gotten there.

MR. McCracken: In order to bring this matter before the house, I will move that it is the sense of the State Board of Agriculture, that the invitation to the farmers of Pennsylvania to spend a week at the State College of Pennsylvania, be accepted.

The motion was seconded by several members.

PROF. VAN NORMAN: I just want to say that I am not in a position to extend an official invitation; that is a little strong. If the Colonel approves that, then I am all right.

COLONEL WOODWARD: I am perfectly willing to assume that position and responsibility for the Board of Trustees and for the Faculty, as I feel sure it will meet with their hearty approval.

PROF. VAN NORMAN: My idea when I made the remark was to throw it out to you as a suggestion or a feeler.

MR. BLYHOLDER: Are we in a position to accept an invitation for the farmers of the State of Pennsylvania? I believe that our motion had better be that we approve of such a meeting. I think that that will be advisable. I do not believe that we are ready or authorized to accept the invitation on the part of the farmers of the State.

MR. McCRACKEN: Mr. Chairman, my motion was that it was the sense of this meeting that the invitation should be accepted.

MR. HERR: I think if the motion was passed as he put it, it would be construed to be an invitation to the Board of Agriculture, and I want it to be extended to the farmers of the State and not be confined to the Board of Agriculture.

The CHAIRMAN: I think that is the sense of the motion, as understood by the Secretary.

MR. McCLELLAN: I would like to inquire whether the people at the State College or in that vicinity would be able to take care of three, five or seven hundred people that would meet there at one time.

PROF. VAN NORMAN: That thing ran through my mind. I believe that we have dormitory facilities for between five and six hundred students in the town. If you gentlemen are willing to come after Christmas, there would be a week before the opening of the next term. I know that we have quite a good eating-house up there in the campus, and I think that the sleeping business can be taken care of when you get there.

The SECRETARY: Would it not be better to come in the summer than in the winter?

PROF. VAN NORMAN: Farmers can usually get away better in the winter than in the summer.

The CHAIRMAN: This brings the subject up for consideration and it will work itself out in the future, and this motion, as I understand it, does not bind this Board to anything only to take the matter home and endeavor to educate our people to it. Is that correct?

COL. WOODWARD: That is correct.

The question being put, it was agreed to.

Dr. Rothrock was called for and came forward.

The Chairman: It is not necessary to introduce Dr. Rothrock to this audience.

DR. ROTHROCK: Mr. Chairman and Gentlemen: I did not understand that I was expected to speak. I just came in from the mountains. I am very glad to be with you again, and very glad to meet you all. I do not come now in an official capacity, but come because I want to see you.

There was one point that I listened to with a good deal of interest, and that was in regard to alfalfa, or rather, the address on alfalfa; I just came in when you were hearing it. I know a good deal about the difficulty of growing alfalfa. I have made several attempts myself to start alfalfa and unfortunately have been unsuccessful; but a number of years ago I was up in Pike county in this Commonwealth, and in front of one place where I was stopping, a gentleman brought a little sprig of something, and I looked at it, and I said, why that is alfalfa. I said, How did it get here? Did you ever sow

alfalfa? No, they had never sown alfalfa. It was an old lawn, an old sod which had been in existence probably for fifty or sixty years. I said, I want you to mark that sprig of alfalfa and see what becomes of it, and as far as I was able to trace it, that sprig of alfalfa has been growing and increasing its area. I suggested that I thought it might be due to the fact that the seed had been dropped right in the grass, in the soil. I tried that, but I did not get a good result. I tried it at different seasons of the year, but did not get a good result. Evidently that alfalfa was dropped in among the grass. I know the value of alfalfa. I know it is of great value and that it is a great western crop. It grows down in New Mexico, and in South America it is in common use, and has been for years in Southern Europe, particularly. Now I would like to ask the gentleman who addressed us on alfalfa, if he can give us any explanation of this Pike county phenomenon? I do think that if alfalfa could be started that an immense gain would be had. I know that we need all those things.

I am not one of those who believe in the Malthusian doctrine that it is necessary for wars to lessen the number of the human race, and sweep away the inhabitants of the earth. I do not believe in that doctrine.

Just at this point, the Governor of the Commonwealth came in.

The CHAIRMAN: I am glad to introduce to you the Governor of this Commonwealth, Samuel W. Pennypacker; although it is hardly necessary, as I think you all know him.

GOVERNOR PENNYPACKER: Mr. Chairman and Gentlemen, I have been very busy to-day and have had no time at all for the preparation necessary to meet with you, and it only remains for me to say that it is an exceedingly great pleasure to me to be with you.

Sometime ago as I was on my way down toward the Perkiomen, I met a man in the station at Reading, and he came to talk to me, and I talked to him, and the matter was dismissed from my mind; but I heard afterwards that he had given a report of the interview and he told his friends, referring to me, that I was the most unassuming person he had ever met; that I looked just like an old farmer. Now, whether that was more complimentary to me or less complimentary to you, I leave you to judge for yourselves.

It seems to me that in one most important respect, the occupation of a farmer differs from all other avocations of life. You hear a great deal about the business which men conduct, and the professions which they pursue, and the wealth which they acquire, and we know that the wealth which is accumulated under present conditions by men who are engaged in the coal oil business and men who operate coal mines, and men who conduct railroads, is often enormous. It is not so often that we hear of great fortunes accumulated by the farmer, but the man for instance, who takes coal oil out of the earth, presently, toward the close of his life, you hear of his being possessed of a hundred millions, with an ambition to be the richest man on earth, to be presently a billionaire. When you look right down to the foundation of it, what does his fortune represent? Ages ago the Lord put under the surface of the ground that natural deposit of oil, doubtless intended to be for the benefit of humanity in future ages, and by some process he has secured posses-

sion of it. He didn't put it there; he didn't make it; he found it, as it were, or the conditions were such, the commercial conditions which this immense deposit of wealth represented were such, that it has fallen to him. You look at the coal and it is substantially the same thing. Countless ages ago, huge forests grew over the earth, and presently the wood was gathered together through the instrumentality of a deluge of water, and deposited in some place or other with a superincumbent mass of earth that was heaped over it, and was presently carbonized, and there was the coal. The men who get out that coal, think of course, that they are great business men; that they are advancing commerce. They talk to you about commercial interests, but remember that every ton of that coal which is taken out and sent abroad, is just that much native force gone. So far from seeking to distribute and scatter it, so far from regarding it as a public benefit, that it should be sent over to Manchuria to enable the Japanese to shoot Russians, or the Russians to shoot the Japanese, it represents just that much waste, just that much dispersion, and the men who handle it have nothing to do with the accumulation of that wealth.

With the farmer it is a different proposition. Every ear of corn, every blade of grass, every beet and turnip, every calf that grows to a cow on his place, represents his own productive work, therefore, it is manifest that not only all those people live because of the work which the farmer does, but his work represents not waste and destruction, but an addition to the material welfare of humanity and productiveness, and it is in this respect that the work of the farmer differs from that of almost all the other men who have their lives and being upon the face of the earth.

Now I have talked to you rather longer than I expected. As I said, it is a great pleasure to me to be here with you; I am a sort of a dilettante farmer myself. I have two farms, and I undertake to see them every two or three weeks. I go over them and fancy they belong to me and see what is going on. To some extent I supervise them and see what is being done. In that sense I may be said to be a farmer, and I am very well satisfied that it is so.

I found this by experience as well as by observation: When a young man, with all his aspirations and ambitions before him, starts out on his career, he thinks it would be a great thing to go out into the great crowd where things are moving amid the noise and cries of trade and commerce, where things are going along, and to venture his fortune there. He tries it, and ninety-nine times out of a hundred he fails. He had better have stayed at home and kept out of such crowds, and the hundredth man who has succeeded feels as he gets along in life, as he gets older, as he perhaps accumulates stores of wealth, that he wants to escape from it, and to get back to the quiet farm life where he was born.

I am pleased to see you here and to see so many of you, and I am quite sure that your deliberations will be impressive and successful, and will result in accomplishing much good, not only for yourselves, but for the Commonwealth in which you live.

The SECRETARY: Now Mr. Chairman, the Governor tells me that he had hoped that he would be able to shake you all by the hand.

The GOVERNOR: I will do that if they wish it.

The Governor then held a brief reception during which he shook hands with all present.

On motion, duly seconded, the meeting adjourned to 7.30 o'clock P. M.

Harrisburg, Pa., 7.30 P. M., Thursday, January 25, 1906.

The meeting was called to order at the designated hour, with Mr. P. S. Fenstermaker in the Chair.

The CHAIRMAN: We are now ready to receive the Report of the Committee on Identification of Fruit.

The report of the committee was presented and read by Dr. J. H. Funk as follows:

REPORT OF THE COMMITTEE ON IDENTIFICATION OF FRUIT.

Your Committee to name fruit respectfully submit the following report:

We have examined the fruits displayed and find the display of excellent quality. Mr. Chester Tyson, of Floradale, displayed nine plates of York Imperial.

A. I. Weidner, of Arendtsville, displayed: One plate, York Imperial; one plate, Smith Cider; one plate, Ben Davis; one plate, Dominee, one plate, Munper Pippin.

C. B. Hege: One plate, Grimes Golden; one plate, York Imperial.

Col. H. C. Trexler, Lehigh county, displayed one plate, King.

M. M. Naginey, Mifflin county, displayed one plate, York Imperial; one plate, unnamed.

The above fruit was especially fine, smooth, clean from fungi and codling moth, and of high color, showing that with the care taken by above exhibitors the finest of fruit can be and is raised in Pennsylvania.

J. H. FUNK,
J. F. BOYER,
A. I. WEIDNER,
Committee.

DR. FUNK: Mr. Chairman, I wish to say in regard to these York Imperials, that I think they are about as fine a York Imperial as we often see; in fact, I think there is no place in the State of Pennsylvania or any other state that produces as fine a York Imperial as we find in York county and Adams county, the home of that apple; and those people are especially progressive along that line. They are spraying almost to a man, and the result is, they get fine fruit there. The York Imperial is not as good an apple as

a great many others, yet you all noticed here this afternoon that everybody wanted apples and they were all distributed, except one lone plate of Ben Davis, and I had to almost insist on the Secretary taking one, and then he said, instead of taking them for himself, he would take them for his wife.

It was moved and seconded that the report be received and placed on file, which was agreed to.

MR. HERR: Mr. Chairman, I would call your attention to the fact that the Chairman of the Committee on Apiary is here. He has not been called upon yet.

The CHAIRMAN: I think that is true; it is my fault.

MR. WELD: Mr. Chairman, I would like to know if this exhibit of fruit is to be continued from year to year?

The SECRETARY: It is, until some other action is taken. I would like to ask the question now, whether it is the sense of this Board that an exhibit should be made at the Spring meeting, if the meeting should be in the Spring, or will you leave it to the judgment of the Secretary, whether preparation shall be made for it. If our meeting should happen to come when there isn't any fruit to display, as it might be, as it was done at West Chester. What do you think about it, Brother Herr? What was in your mind when the motion was made?

MR. HERR: I do not think we can have a display the last of May that is worthy of any particular notice, unless it be of small fruits. It is a little doubtful whether the strawberry season will then be sufficiently advanced to permit of an exhibit. If they hold it in May it is hardly likely that it will be ready, and I do not think it is worth while to try to make a display at that season of the year. If it is held in October, I think that is an ideal time to bring fruit of all kinds here.

The SECRETARY: Perhaps it ought to be left to the discretion of the Secretary as to whether an exhibit shall be made.

MR. HERR: That is the idea, and I will make that as a motion.

The SECRETARY: I will understand it that way without a motion if that is the idea.

MR. CLARK: Mr. Chairman, it seems to me that it might be well to add to this exhibit, corn. When we look over the improvements that are going on in other states, the great effort that is being made to increase the growth of corn, I am satisfied that this State can profitably spend some time and some money to try to increase the growth of corn and get the best. It seems to me that it would be a very small matter for each member and some of his friends, to send an exhibit of corn, and we could see then what was going on and then get the best. I do not know whether it would be right for me to make this as a motion, but it strikes me as though we ought to do something along this line.

MR. NELSON: Mr. Chairman, I think that is a good suggestion; I think it might be possible to broaden it out a little. We had that

up in our county, to have some general exhibition in that line and whether that would be practicable and how far that would go would depend on the action taken by this Board, whether it will only be just for fruits or to include some of the cereals also; there may possibly be some contest in that line, and there may be some very good specimens if put on exhibition and the question is, How far will we go in that line?

The SECRETARY: My thought is that the people in the community where we meet can make just whatever kind of a display they care to make. That will be part of the reception that will be given to the Board. We don't care how large it is because usually the fruits are divided among those that are present. I don't know that any of us will care about carrying away any corn.

MR. HERR: Mr. Chairman, I had the pleasure of attending a meeting at Atlantic City, and there I saw one of the finest agricultural exhibits I ever witnessed in all my life. It was simply the products of New Jersey, attractively arranged by the different Pomona Granges of the State of New Jersey. Now I would like to make a motion, to allow Clearfield to make a competitive exhibit at the meeting, if it is held there in the Fall, if they do it at their own expense.

MR. BLYHOLDER: I would ask the gentleman if he hadn't just better make it that any county where the meeting is held as well as Clearfield county. The idea I want to include is, that any place where we hold the Fall meeting it shall be done, so that if we see fit to go to some other county, that they will be allowed to make that exhibit.

MR. HERR: A standard exhibit?

MR. BLYHOLDER: Yes.

The SECRETARY: I don't quite catch your idea.

MR. HERR: My idea was that the people of Clearfield county be invited to make such an exhibit as they see proper to make, provided they do it at their own expense.

The SECRETARY: I second that motion.

MR. BLYHOLDER: Mr. Chairman, I would move you then, that the motion which calls for an exhibit of fruit be so amended as to read "fruit and corn."

MR. HERR: Mr. Chairman, I will amend the motion by saying "cereals."

MR. NELSON: I second the amendment.

MR. HERR: Mr. Chairman, my motion was to amend the motion made by Mr. Blyholder; his motion has not been acted on yet.

The SECRETARY: I only heard the one amendment. Mr. Blyholder's motion was that the standing resolution shall include corn, and I heard an amendment that it should be cereals instead of corn; that is all I heard.

MR. HERR: That is the idea.

The question being, shall the amendment prevail? It was agreed to.

The question then recurring on the original motion, as amended, which was also agreed to.

The CHAIRMAN: We will now hear the Report of the Committee on Apiary. J. W. Nelson, Chairman, Shawville, Pa.

Mr. Nelson presented and read his report as follows:

REPORT OF THE COMMITTEE ON APIARY.

BY J. W. NELSON, Chairman.

The spring of 1905 found the bee industry in a bad condition, owing in part, to the extremely hard winter and in part to the prevalence of foul or black brood over a large part of the State. Spring opened with fair weather during fruit bloom; followed by an abundance of clover bloom. But the weather was so wet during the last of May and the month of June that no surplus was gathered. July was a beautiful month and some surplus was gathered. There was an abundance of buckwheat, but most of the nights in August were too cool and no buckwheat honey was gathered worth while. September was also cool and no white honey was gathered. On the whole the season was medium; good in places and poor in others.

Nothing has been done in the way of legislation to protect the bee keepers from the ravages of foul or black brood. I think a county law would be best if properly framed, but the best remedy would perhaps be to educate the farmer at the Institutes and by Bulletins. As to the contagious character of these diseases, to this end I attach an article by E. W. Alexander, of New York, including the introduction by E. R. Root. These and other experiments along this line would seem to indicate that it is possible to exterminate the diseases, if done intelligently, and that too without destroying the diseased property. If this hope proves true, and I think there is no doubt it will, it means thousands of dollars to the industry, for there is no branch of agriculture that will yield so much return for the money invested, either in money or information.

It would be hard indeed to find a more interesting subject for study than apiculture. As an introduction to the subject of Nature study nothing else will compare with it. The bee is a most marvelous piece of creation, as to its physical structure in which it shows its wonderful adaptation for the work it has to perform, but it is the living link between the members of many families of the vegetable kingdom and becomes the active agent in cross fertilization in the perpetuation of their species. It will thus be seen that one can not progress far in the study of this little insect without discovering one of nature's most mysterious processes. It would

be hard to find anything more interesting than the little realm bounded by the walls of a beehive. When we enter that domain: or better, observe it through a glass wall, it is to find a most orderly and perfectly regulated commonwealth, its thousands of inhabitants working in perfect harmony, an example we might well imitate. There ought to be the most friendly relations between man, the highest form of animal life and the honey bee, his most useful friend among the insect world. It has become such a fixed notion in the minds of most people that bees sting, that one would think that stinging was their principal business; but while all working bees can and will sting if occasion requires, the fact is most bees never do sting at all. Few of us realize the magnitude of the forces in operation in the material world about us and fewer still have the time or the opportunity to study how those forces operate. Only a very few can have the means to penetrate the depths of the heavens to explore them to add to the sum of human knowledge, but any one with an eye to see and a mind to grasp may walk afield and find the world a great hive of industry in which myriad forms of insect life are working out world processes. It is getting to be more and more necessary to know about these creatures. Some of them enemies and some of them friends of man. At the head of the list of friends stands the honey bee. Get acquainted with it, its acquaintance will do you good.

The following is the article by Mr. E. W. Alexander, as noted above:

HOW TO RID YOUR APIARY OF BLACK BROOD.

A Cure that is Easily and Cheaply Applied without the Destruction of Combs, Bees, Hives, or Utensils; a Valuable Article.

[It may, perhaps, stimulate a more careful reading of this article than it would otherwise receive when I state that we have paid Mr. Alexander for the privilege of giving this method to the world more money than we have ever paid for any other article we have ever published, several times over. Black brood, or the New York bee-disease, probably the most destructive of any brood disease, was raging among Mr. Alexander's bees with unabated fury three years ago. When he blundered on to this cure he scarcely realized that he was going to rid the bees of the disease; but the proof of the pudding is in the eating. I personally inspected hundreds of the very combs that were, three years ago, badly infected, and which at the time of my visit were filled with as nice solid healthy brood as one could wish to see. There was only one colony that had a cell or two of the disease, but this was not treated strictly according to the method to be described. One or two of the details were omitted to see how far he could deviate from the plan. It is, therefore, with more than ordinary pleasure that we are placing before the bee-keeping public one of the most valuable communications that it has ever been our lot to give in these columns. I expect to have it all printed in small pamphlet form, and send it out for free distribution by the thousands. Of course, I may be mistaken as to its value, but I hope it will be the means of entirely emancipating the State of New York from the ravages of this dread disease, and other places where it may find a footing.—Ed.]

"This has been one of the hardest problems for me to solve that I have ever met in bee-keeping. For three years we tried every thing in the line of disinfectants that we could hear of, also putting our bees on foundation, which did but little good. Some of the things

we tried seemed to help at first to check its deadly work; but in a short time it would show itself again as bad as before; and so the years went by while we lost nearly our entire honey crop and over a thousand colonies before we got the first sign of a cure, and even then it was so simple it seemed like a drowning man catching at straws. But I kept at the little proof I had until I developed it into a perfect cure. Then for three years we tested it thoroughly on hundreds of colonies, so that we could be sure it was a cure which could be depended on, and now I send it to *Gleanings* for the A. I. Root Company to give to the world.

"This cure is on the line of introducing new blood into the apiary, which will necessitate getting a choice Italian breeding-queen, one of the best honey-gathering strains that can be procured. For this special purpose I prefer quite yellow Italians. Now for the cure.

"Go to every diseased colony you have, and build it up either by giving frames of maturing brood or uniting two or more until you have them fairly strong. After this, go over every one and remove the queen; then in nine days go over them again, and be sure to destroy every maturing queen-cell, or virgin if any have hatched. Then go to your breeding-queen and take enough of her newly hatched larvæ to rear enough queen-cells from to supply each one of your diseased queenless colonies with a ripe queen-cell or virgin just hatched. These are to be introduced to your diseased colonies on the twentieth day after you have removed their old queen, and not one hour sooner, for upon this very point your whole success depends; for your young queen must not commence to lay until three or four days after the last of the old brood is hatched, or 27 days from the time you remove the old queen. If you are very careful about this matter of time between the last of the old brood hatching and the young queen commencing to lay, you will find the bees will clean out their breeding-combs for this young queen, so that she will fill them with as fine healthy brood as a hive ever contained. This I have seen in several hundred hives, and have never seen a cell of the disease in a hive after being treated as above described.

"It is not necessary to remove any of the combs or honey from the diseased colony; neither is it necessary to disinfect anything about the hive. Simply remove the old queen, and be sure the young queen does not commence to lay until three or four days after the old brood is all hatched. This treatment with young Italian queens is a perfect cure for black brood.

"In regard to those old queens that were formerly in your old hives, I think it best to kill them when you first take them from their colonies—not that the queen is responsible for the disease, for I am sure she is not; but a young Italian queen that has been reared from a choice honey-gathering strain is worth so much more to you that I can not advise saving these old queens.

"I have experimented along this line considerably, and found, after the colony has been without a queen 27 days, as above directed, it will usually be safe to give them one of these old queens, and the cure will be the same. Still, there have been exceptions, so I advise killing them at once.

"Now a few words about your breeding-queen. Buy one of the very best you can for this purpose; for upon her real merits rests the true value of your apiary hereafter. I would buy a three-comb

nucleus with this valuable queen, so as to run no risk in introducing her to a full colony.

"Now, my friends, don't let another season pass without cleaning your apiary of black brood, and also at the same time requeen it with young Italian queens so you will not only harvest a fair crop of honey next summer, but will have an apiary that you will be proud of and take pleasure in showing to your friends. I know many of you have become discouraged in trying to rid your apiaries of this fatal disease; but that does not help matters any. The only proper thing to do when these troubles do come is to face them with a determination to overcome any and every obstacle that comes in your way; then when success rewards you for your perseverance, how pleasant it is to look back over the past and realize that you have accomplished all you labored for. I hope that you who have this disease in your apiaries will give this treatment a thorough trial next season, and please report the result of your trial to *Gleanings* so that every reader of it will have your opinion of the method."

I wish to call our readers' attention to the fact that there are two or three important factors in administering this treatment. The first is Italians, with a preference for the extra-yellow stock. Experience has shown in thousands of instances that black bees are very much more prone to get this disease in the first place, and when they do get it they are more liable to succumb to it than Italians or Carniolans. Put this fact down big.

Second, the bees must be *given time enough to polish up*—that is, disinfect their combs *in anticipation* of a laying queen; for, as Mr. Alexander points out, the bees must not be allowed to have a queen until after 20 days of queenlessness. The *rationale* of this is thorough cleansing and disinfection. During the 20 days that intervene, the bees are *constantly expecting* a queen, and therefore polish and repolish up the cells ready for her. This scrubbing apparently cleans out all the old germs of the disease. During the interval of twenty days the nurse-bees use up all the chyle, or larval food, containing a taint of the disease.

Now right here this question may come up. When brood-rearing stops in the fall, there is not only 20 days without brood, but many times 20. Why, then, should these same colonies next spring, as they have repeatedly, come down with the disease? Mr. Alexander explains it in this way: When the queen stops laying in the fall, the bees do not polish up the combs as they do in the height of the season, when the bees are fairly howling for brood or eggs. The combs are left smeared with dead brood; the stuff dries on hard, and is not removed till the subsequent spring; but in the height of the laying season or brood-rearing season the combs are cleaned up, when the dead matter can be removed in a sort of viscid state, and before it has been glued fast to the walls of the cells. Mr. Alexander and myself talked it over in company with no less a bee-keeper than P. H. Elwood, who was present one of the days when I was at Mr. Alexander's yards. On no other ground can be explained this cure, except, possibly, that the disease might have run its course at the Alexander yard, the same as many infectious diseases do. But when we understand that black brood continues on in other yards in the immediate vicinity where this treatment has not been applied, we are almost forced to the conclusion that the Alexander plan has a great deal to do with the disappearance of the disease.

Another fact that seems to be a part of the treatment is, that of the removal of the old queen. In view of the fact that it always pays to requeen at least once in two years, and sometimes oftener, we can hardly count the destruction of the old mother an actual loss. The only loss we can figure on at all is the absence of all brood for 20 days; but this does not compare with the nuisance and expense—the great expense—of destroying thousands and thousands of good combs as well as the frames containing them, even if we melt them up, the return is small, comparatively. Then there must be the foundation, which, according to the McEvoy treatment, must be cut out at least once, compelling the bees to try again.

Up to the present time the McEvoy treatment was considered the most effective, but not a cure in many cases. The reason for this is not hard to understand. The destruction of the old combs and the compelling of the bees to draw out two sets of foundation involves the cessation of brood-rearing at least a week and probably longer, and, at the same time, the entire removal of the source of infection that might be in the old combs. But the treatment too often failed because the germs of the disease would still reside in the alimentary tract of the bees, sufficient time not having elapsed (20 days). As soon as the young larvæ require feeding, the larval food itself would be liable to have the germs and reinfect the young brood.

Another interesting fact is, that Italians are more proof against the disease than the blacks; and why is this so? Probably because they are less inclined to rob, but more probably because they do a more thorough job of housecleaning than the native bees of this country.

E. R. ROOT.

DR. FUNK: Mr. Chairman, I would like to ask Mr. Nelson what he has to say about the non-stinging bees.

MR. NELSON: I will say in reply to Dr. Funk that I have not had any experience with them. I see there has been a great deal of experimenting done with them, but it is only experiment.

DR. FUNK: Isn't the Government doing something in that regard?

MR. NELSON: The Government is distributing different varieties of queens to the United States to people who understand handling them, among others, the bee of Africa, or the large bee. There has been many an attempt made to domesticate them, but it has not proved a success yet.

DR. FUNK: It is not a stingless bee, is it, really? They have stings, haven't they?

MR. NELSON: No, they are a stingless bee.

DR. FUNK: I thought it was like a queen that don't sting.

MR. NELSON: That is not correct. They use it sometimes.

DR. FUNK: Yes, use it royally.

On motion, duly seconded, it was ordered that the report of the Committee on Apiary be received and placed on file.

The following is the Report of the Committee on Poultry:

REPORT OF THE COMMITTEE ON POULTRY.

BY N. G. TEMPLE, Chairman.

The increased attention that is being devoted by the public to the subject of Poultry Keeping is attributable mainly to one or other of two widely different causes, as either the large number of exhibitions of high-class fancy fowls has attracted the attention of the amateur, or else the official statements that have appeared concerning the vast sums of money which the inhabitants of this country pay the foreigner annually for poultry and eggs have convinced the fancier that it is his duty to endeavor to assist in retaining a portion of this wealth in America.

We find that Pennsylvania stands fifth on the list in point of value of eggs and poultry produced, with Illinois, Iowa, Ohio and Missouri leading, and it certainly is very important that the farmers of this State make a greater effort and have the Keystone State head the list when the time rolls around for the next census. Permit me to call your attention to what is being done at State College to further the poultry interests, and give to the younger generation who may be so fortunate as to be able to attend the new Agricultural end of the College, a far greater knowledge of this much neglected work.

At the last session of the Legislature \$2,500 was appropriated for the Pennsylvania State College Agricultural Experiment Station, for the construction of a tool-house and poultry houses. The Trustees of the College divided the appropriation equally between the tool-house and the poultry houses, that is \$1,250 to each.

At the Pennsylvania State College, the first poultry house consisted of a little building about 12 feet square with a board roof, that had been discarded by another department of the College, that had formally used this building as an observatory to protect star gazers in windy weather. Then for several years a small poultry plant, which satisfactorily accommodated five or six small pens of fowls, that were used for educational purposes. One of the most urgent needs was an incubator building wherein artificial incubation could be carried on in a satisfactory way. During the time that the poultry has been kept by the College for educational purposes, artificial incubation has been a most serious problem. Sometimes incubators were run in offices, sometimes in cellars, and one season for a time in an old cistern that was used for a root cellar. Later, however, it was found to be wholly impractical on account of insufficient ventilation. The other places for running incubators were opposed to by the Insurance Company, and finally artificial incubation was prohibited. Consequently, one of the greatest needs was an incubator building that would be sufficiently large to meet the requirements of the Experiment Station and sufficiently removed from other buildings to meet the requirements of the Insurance Companies.

A small brick building, 19 by 25 feet, having a hollow wall, cement floor, and steel ceiling has been constructed, which will undoubtedly meet the requirements, for the present at least.

In addition, two poultry houses have been constructed, each 12 by 20 feet and divided into two pens, each pen having a capacity of from 12 to 20 fowls, making in all winter houses that will accommodate from 150 to 160 fowls. The new poultry houses are furnished with scratching sheds and will be furnished with an adequate yard or run for each pen. Until the present time the Experiment Station has had no interest in the fowls maintained by the College, and no attempt has been made to use fowls in any extended way for experimentation, the poultry being maintained by the College wholly for educational purposes. Each year, both the four year students and the students in the Short Courses in Agriculture, have been given from 25 to 30 lectures covering the various phases of the poultry industry. During the time these lectures were given they have been supplemented by practical work in judging fowls, both by comparison and by means of the score card.

It is thought best to use the fowls that are now to be placed in charge of the Experiment Station for educational purposes as far as they may be used without interfering in any way with experiments that may be in progress.

It is hoped that in the near future some questions of incubation may be taken up for thorough and comprehensive investigation, which will involve not only close attention of the practical poultryman but of the competent Biologist. While aside from the many questions pertaining to incubation and the development of the various classes of fowls, it is thought that many experiments pertaining to breeding and feeding may be carried on at some time.

It is now proposed to begin series of experiments on some lines of poultry work that are of sufficient importance to warrant the expenditure of considerable time and sufficient money to properly conduct the investigation. One on the line of investigation, which will be taken up in the near future, possibly at once in the department, if possible, is the comparative development of the young of the various classes of fowls. It is to be hoped that several breeds of each class may be used, in order that the average may be taken as a fair representative of the class. These comparative developments are hoped to include not only total live weights, but the production of flesh and skeleton, both from the standpoint of total weight and economy of production.

We are sure that the work which is now made possible by the erection of the houses and yards already alluded to, are only the beginning of a work of vast importance to the poultry interests at large.

Another important experiment is being worked out within 25 miles of Philadelphia, one to the west and one to the south, by which it is proposed to keep and winter in open sheds facing the south, fowls in a working condition. One shed is 70 feet long by 12 feet wide; holding 70 chickens with no protection at all in front. The other shed is 150 feet long, same width; holding 200 hens with a hinged canvas windows, which is lowered at night. From both of these quarters the number of eggs gathered has been far above the average, and all the stock is strong and healthy. The winter, owing to the mild weather, has not as yet proven the advisability of so radical a

change, but should the theory work out as planned, the much disputed question of ventilation will have been quickly settled.

The rapid increase in the use of artificial methods has produced a large amount of fresh stock during the off-season, but the rapid increase in the population of the country, and especially the rapid growth of our large cities, has so increased the consumption and the demand that the increased production, together with the large tonnage put in the freezers every fall and marketed during the winter, has not decreased the price. The only effect has been to make the season of high prices somewhat shorter. The increased consumption has kept pace with the production, and with the settling up of the prairie lands and the cutting up of the large ranches, the possibility of low-priced beef and mutton has decreased, and there is little likelihood that we shall ever again see low-priced eggs and table poultry, or much change in the average run of prices for the different seasons of the year. We can, therefore, lay our plans for poultry raising on the basis of current conditions, with a reasonable assurance that these conditions will be maintained for an almost indefinite period.

Professor Watson has said: "It is a matter of common observation among stock breeders of the country that many farmers have been sorely disappointed when they have attempted to breed one or more of the improved breeds of live stock. While they perhaps purchased good animals as foundation stock, and undoubtedly would have succeeded had they bestowed the proper care, yet the fact was well fixed in their minds, that, if the improved breeds were better than the animals that they had formerly kept, they would prove better under the same conditions that their animals had been kept under for many years. The results showed that the improved animals did better for a time. There seemed to be a reserved power or tendency towards an increased yield of desirable products over that which the farmer had received in previous years. The next generation was less satisfactory, and each succeeding generation approached more nearly in production that of unimproved animals, until finally a stage of production was reached which would be maintained by the care and food that was bestowed. As the spring cannot rise higher than its source, neither can the productiveness of our fowls maintain a higher standard than the care and food bestowed upon them will maintain. The less energy the fowl bestows on self-preservation the more may it bestow on those products which men most desire.

Improved domestic stock, among which fowls may properly be classed, have aptly been compared to agricultural machinery or implements. In pioneer times the farmer used rough, rudely-fashioned implements that in the light of modern times would not be called efficient. They were heavy and clumsy and accomplished comparatively little good for the power expended to propel them. But, because they were strong and the soil was mellow, they answered his purpose. To-day the farmer must have, if he be a successful competitor in the markets of the world, machinery that is more complicated, more delicate of construction, but that will accomplish more for the power that is expended to propel it. There is not a harrow on the market to-day that is as strong and will withstand as much as the old-fashioned drag made from the crotch of a tree. Neither

is there a breed of improved stock which will endure the hardships that are required of the now existing wild forms; and yet, one hears hardihood talked of as a most desirable quality. We must not fail to distinguish between health and hardihood. Great hardihood necessarily means limited production; limited production means little or no profit. The most profitable animal machines are those which will consume and turn to good use the greatest amount of food and expend all their energies in producing desirable products. If this be true, is not the neglectful poultryman, who cares largely for plumage, a hindrance to the great poultry industry of the country? If neglect induces hardihood, then he who bestows the best care is tending to produce the most remunerative breed or race of fowls. Discomfort and economical productions are never closely associated. Improved care and food have ever been potent factors in the improvement of domesticated animals. It is a significant fact that all noted breeders have been skillful feeders. As care and food have so largely made the many useful breeds of which we may well be proud, so is it necessary to bestow equal care if improvement is to be maintained.

I am sure that every thoughtful poultryman desires to improve his stock. He knows that it is susceptible of improvement and that he can improve it if he but take the pains and bestow the necessary care. Whatever way we may eventually drift, I am sure that I voice the sentiment of every one present when I say that it is our desire to so care for our fowls that we may at least leave them as good as we found them.

The CHAIRMAN: The closing topic on our program for this evening is "Barn Ventilation," by H. E. Cook, of New York. We shall now be pleased to hear from Mr. Cook.

The SECRETARY: Mr. Chairman, I want to say, through the Chair, to Mr. Cook that you have the cream of the audience; you know they are the people who always stay until the end; these are the people who really want to know, so you must not conclude that it is not worth while to do your best.

BARN VENTILATION.

BY H. E. COOK, Denmark, N. Y.

I want to tell you a little experience I had that this small audience brings out, a number of years ago in my earlier institute experience. I was at an institute where the attendance was very small; I think perhaps there were a dozen in the room, there was a gentleman present who was very popular in our State, a member of our State Legislature, a man who had been instrumental in helping in the carrying out of our agricultural legislation. I was hesitating somewhat as to whether it would be worth while to go on, and he says, Young man, I want you to understand that I am just as much

entitled to this work as though the room was full." I never have forgotten it, and there never has a farmers institute gone by the board if there was one man present. I believe that is the right principle to work under.

Now I am taking it for granted that we have a room ready for the ventilating flues, unless there is some question that you would like to bring out; if there is any such question concerning the construction, let us have it now. I want you to understand that if the construction is not right, the flues won't work, and I could not guarantee for a moment that you would get satisfaction out of any system of ventilation which should fairly well control the temperature in that vicinity.

MR. FENSTEMAKER: Will they answer for some other kind of a tie besides the stanchions?

MR. COOK: Yes, I have provided here for almost any kind. (Referring to drawing on blackboard). This you will understand represents concrete work. The concrete work may perhaps have to be changed somewhat to meet the requirements of the case. I have seen buildings in pretty nearly every shape where mistakes have been made. Now we are going to take the air in through certain flues and going to throw it out through certain other flues. This means first that the flues through which the fresh air, the cold air from the outside comes in, must be thoroughly distributed around the room, or if not possible to do that, as far as they will go.

Now we will suppose that we have here a given amount of air which we will say is sufficient for the room, whatever the size might be. Don't you readily see that the currents of air would form in this shape (indicating) and that this great body or bulk of air in that room would hardly be changed. (See Fig. 1.) That seems easy, does it not, provided this room is tight. If we take the air out of this corner, and take the air out of the opposite corner, we will have not only foul air, but have a condensation of moisture there.

Now come over to this building (indicating on blackboard) and we will take the air in at these points. There is another proposition: Many men have made a mistake right there, especially if the barn had an L attached to it in this shape, and this was all in one stable or one room. They have not, some of them, realized that it was necessary to provide for the intake flues in that projection. (See Fig. 2.) No matter how small that is, it will be as necessary to provide for the intake flues in this space as anywhere else. I think that will dawn on you in a moment. In order to prevent condensation, it will be necessary to keep the air in circulation from this point of the room; the only way we can do this is from these intake flues.

A Member: How do you construct those?

MR. COOK: That is what I am going to tell you. I will put it on the board and I have a little model which I will show you as well. Now we want to build those so that they will work, and so that there will be no chance for them to work the wrong way. You have seen ventilating flues that were wrong side up; instead of the air going out, it came in, and vice versa. Now if these flues were built in this way, and carried on up a very little distance, within the ceiling of the

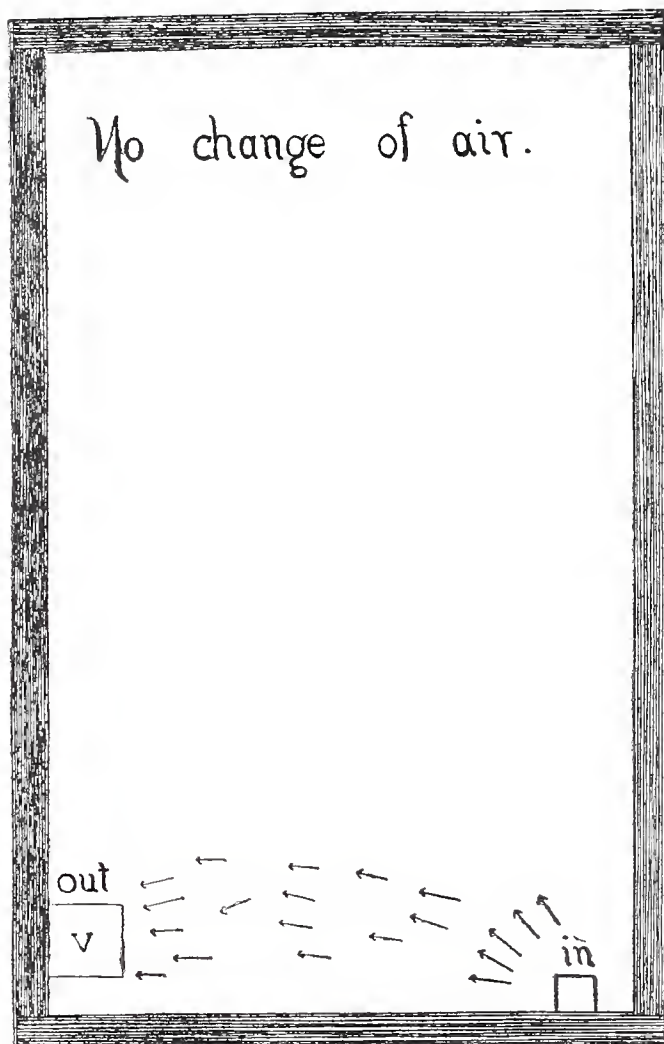


Fig. 1.—The wrong way to place the ventilation flues.

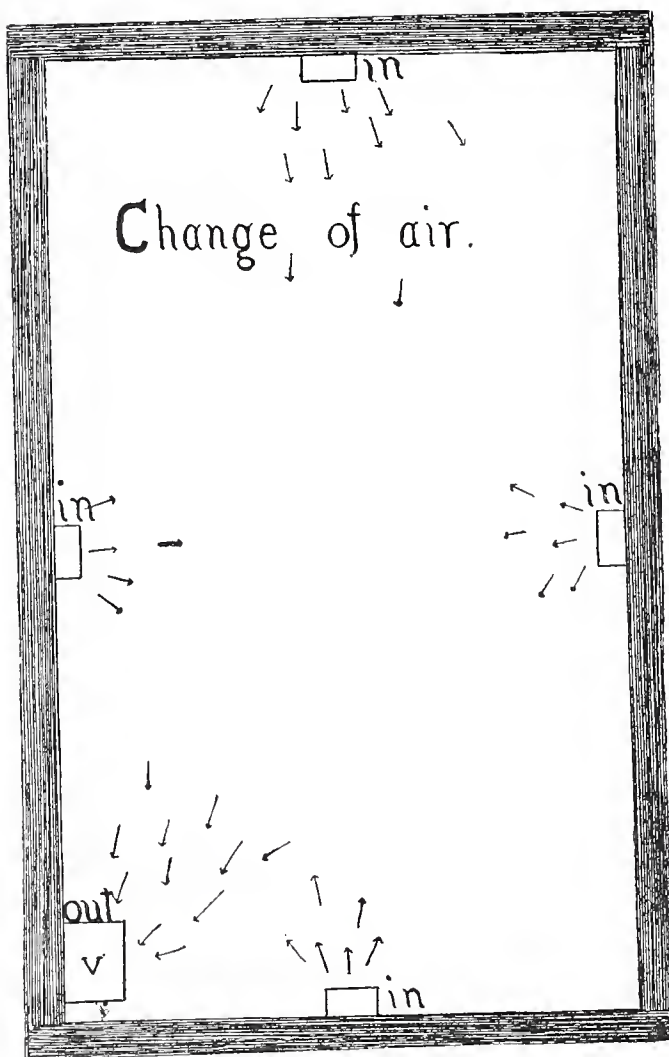


Fig. 2.—The right way to place the ventilation flues.

barn, and there opening the flues, they will always work. The question arises—I think it was Prof. Shaw who put the question—supposing the wind is blowing with strong pressure against this will not. I have watched that repeatedly. I will say this, that a gale blowing on the west side with the flues on the east side of the building it will remain more nearly neutral; that is, the circulation will be very much reduced, but I have never seen the time when the circulation was stopped, much less reversed, for the reason that when the cold air comes in contact through this flue with the warmer air inside of the building, the volume of air by the raising of the temperature is just slightly increased, and just the moment you increase the volume it rises; that is a simple proposition. You need have no fear if they are built at least three feet long. In many of these old barns, the wall is built up part way, and the space between the stalls and top of the ceiling may be only a few feet. The flues will work in this short space.

Now about the size of the flues. It will make some difference where you live, the lower the average temperature during the winter, the smaller one can build the intake flues. The warmer the average temperature, the larger they will have to be. In a section like this, in my judgment you would want to give the building as much intake air as you give it of out-take air. A square foot for five cows, both of intake and out-take surface that is safe, wherever you go. If you are in a locality where the barn is subject to sudden changes and strong winds, then I would have these intake flues under control with some sort of shut-off, so that you will be able to open and close them at will. It is much like a stove, if you put a sack over your chimney, you can open your draft and there won't be very much draft to the stove; if you shut off the out-take flues, you are bound to shut off to a considerable extent, the intake flues.

A Member: Where is the air admissible into the room through the intake flues?

MR. COOK: Very close to the ceiling—next to the ceiling. I might say there is a disposition, on account of a theory existing some years ago, that these intake flues should be made in the ceiling, admitting the air into the center of the room to do that and there were a good many barns built that way, but that surely is not necessary.

A Member: Does the air come in at the bottom?

MR. COOK: The air comes in at the bottom; the flue opens at the ceiling.

A Member: It comes in at the bottom and goes up the side.

MR. COOK: Yes.

The SECRETARY: The air comes into the flue at the bottom?

MR. COOK: Yes, on the outside, and is carried up and enters the room close to the ceiling.

A Member: I understand you to say that that flue should be about one foot square.

MR. COOK: I don't think you would need it a foot square. You will need to have a square foot of air for the five cows. I would not build them as big as that. I don't care how tropical you are. I would not build them as large as that, in my own case. Up there in Northern New York, we get a whole lot of fresh air through a pencil hole.

A Member: What do you mean by a square foot for five cows?

MR. COOK: Say we have a barn with five cows in it. Now we will put an intake flue on each side, and we will build that flue six inches square. That will give us a square foot, wouldn't it. It seems to me that ought to be clear. If we have five cows in this room, we will put in four intake flues six inches square, or six inches in diameter.

A Member: If you have twenty cows then, you will put in sixteen?

MR. COOK: No, I think not; I think I would begin to reduce then. There is a limit to the necessity of flues. We will say that we have a stable a hundred feet long; four intake flues in a hundred feet will do very efficient work; practically four flues in a hundred feet will give you very good work indeed.

MR. HERR: It strikes me that if there was a strong draft there, it would let in more than enough air for five cows.

MR. COOK: In my own case, it would, I am trying to adapt myself to your conditions. We are using about 75 per cent. of intake air as compared with the out-take. We have about three-quarters of intake air to the five cows and that is ample where I live; in our own case, the intake flues are always open.

MR. CLARK: If the wind pressure should be very heavy, would it not be found that there was apt to be a little draft on the cattle? Would you not find difficulty of that sort by adopting this plan.

MR. COOK: Where you are subject to that strong wind pressure, it will be necessary to have them under control, because in the milder days, without the large openings, you would not get fresh air enough.

MR. CLARK: We get fresh air by using a narrow window, and the window was opened at the top just as much as we saw proper.

MR. COOK: In many cases that can be done; in my own case the windows are double, and that of course prohibits the use of windows as intake flues in the winter time. Fix your windows so that they will open; say that this is the inside of the room, and then provide a half chute aside and a space to have two sides on this opening so that there will be an opportunity of the air coming in on each side.

PROF. VAN NORMAN: Why do you say it is unnecessary to conduct air over to the center of the room?

MR. COOK: Because I am satisfied that that fresh air will find its way to every part of the room. There is nothing to be gained by carrying the circulation into the room from there. I suppose if we had a building a hundred feet wide, it would be another proposition.

MR. CLARK: In the summer season, I suppose, the windows are all right?

MR. COOK: Yes.

A Member: If that flue is like that, would that answer every purpose if it was at the top?

MR. COOK: No—do you mean whether we could not use a space right directly through the side of the barn?

A Member: Yes.

MR. COOK: You can't do that because you would be up against the same proposition as with your window, your intake flues would serve as out-take flues on the one side of the barn, and the reverse on the other side. This system is absolutely automatic, only of course you will get a little more air when the wind is blowing than when it is not.

A Member: What would you build those flues out of?

MR. COOK: Anything you please. It will make no difference whether you build them of cement, iron, tiles or board.

Now let us see about the out-take flues. We want to keep in mind the working of the house chimney. We want to understand and go back again to the statement that I made this morning, that there are seven pounds of water in the form of vapor passing off from the animal every twenty-four hours. Now I would not, if I were you, concern myself with the carbonic acid gas in a barn. We want to get rid of it, surely, but if you get rid of the moisture, the carbonic acid gas will take care of itself. It is the moisture that troubles you. Now how shall we do that? In the first place it must be kept in the form of vapor in the stable, because after condensation it is too late; then you can't get rid of it. It must be kept in the form of vapor until it goes out-doors. I suppose that the most of you have had trouble with the stove-pipe in your house. Well, if you haven't, you haven't had all the fun of house-keeping, and you have found that usually where the pipe enters the chimney, after running a long distance horizontally, or after it passed through a cold room, that something happened, either the pipe may have been so long that the current of air in the stove-pipe cooled off or had been condensed upon it, then of course the moisture in that pipe condensed. We have the same thing to deal with here, and the farther north you get the greater the problem is. The farther south you go, the smaller the problem is. Now I would not build these flues, even here, of iron, yet I know of a flue in New Jersey built of galvanized iron, but I do not believe it is a safe thing to advise. With us, we should be in trouble all winter if we did that—if we built the out-take flue with any kind of material that would radiate heat, so that I believe it is safer to build those flues in the cheapest way. The cheapest way is to set up a four by four scantling, and fill that four inch air space with straw. I do not know of any way by which you are so certain to get good flues for so little money. Board it up inside with matched lumber, and board it up on the outside and stuff that four inch air space with straw.

COL. WOODWARD: You have not indicated the size yet.

MR. COOK: Yes, a square foot of area for each five cows.

MR. McHENRY: It would not be any injury, would it, if built larger and filled with straw?

MR. COOK: Well, if I understand you right, the question arises whether there would be a chance of building them too big, getting too large a space; a four inch space will do the work—four inches of air space is sufficient. I thought you meant whether those flues can be built too large. That is a question. Do not build them too big, or you will be up against the same proposition that many have been in old fashioned houses provided with a fireplace and chimney as big as a house, and then they run a single stove-pipe into it and put in a small stove and fail to get the necessary draft. Why? Because the volume of air played tag, if you please, the cold air and the warm air, so there is such a thing as having these flues too big.

MR. HERR: Would there be sufficient draft with a four-inch flue?

The SECRETARY: The gentleman don't understand the construction of your flue.

Mr. Cook illustrated the construction of flues by a diagram which he drew upon the blackboard.

The SECRETARY: (Referring to diagram). That is the top of the flue now.

MR. COOK: That is a section. Here are your four by four scantling in the corner and here is your air chamber filled with straw.

A Member: How about filling it with sawdust?

MR. COOK: Dry sawdust would not be so bad.

MR. FENSTEMAKER: Chaff would be good.

MR. COOK: Good enough, yes. The trouble with sawdust is, it has a tendency, if there is any volume of it, to crowd the boards off, therefore, the lighter material is very much better.

The SECRETARY: The straw put in has a tendency to harbor mice and rats.

MR. COOK: Not with a cement floor.

A Member: How about shavings?

MR. COOK: Dry shavings would be better than sawdust; any dry material like that will do the work.

COL. WOODWARD: Do we understand that we are to pack that straw with some considerable solidity?

MR. COOK: Whole straw I would; with cut straw I would not. I think we have that question of the insulation of the flue pretty well in hand. Now where shall we put it? We lack in a way data on just how far a flue will work. If I can make myself understood—let us take this room. If we locate a flue at either end of this room, might we expect to get the service the whole length of the room? Now I believe this is a safe statement to make. That up to thirty cows in a building—take a building that holds thirty cows, and we

will give them about five hundred cubic feet of air space, and that will be all any dairy cow needs, in fact, she would be better off with less than with more. I would rather undertake to warm less than that, and supply fresh air often, than to warm more than that and reduce the current of air into the room. Five hundred cubic feet of air space is enough. That will be sufficient for each cow, where you have no more than thirty cows to supply. Now give her that, and putting no more than thirty cows into the room, I feel very sure that one flue will suffice. I am not sure but that it will do more; or you can divide the flues as you see in this model and carry it up half on each side. We can expect one set of flues like that for thirty cows to be ample. Now that would give us, you see, about two feet and a half square, or two flues 15 in. by 30 in. Your flue must always go to the highest point of the barn. If you have ever had any experience with boilers, running them up to their capacity, maybe you have found that your smokestack was not long enough. I have had that experience myself; I have a creamery located where trees have been planted fifty or sixty years, and I have had to go up above those trees or the current will work down, and interfere with the draft. Now we have the same proposition in this ventilating flue.

I visited a concrete barn recently where the out-take flues were short, projecting through the roof, and covered tight with a concrete cap. Small openings being left in the sides—of course the circulation was sluggish and the system a failure.

THE SECRETARY: He didn't want the rain to get in, and the snow.

MR. COOK: To secure the circulation that he wanted—he should have carried those flues up through this concrete roof, as he could easily have done with a box, and left the box in there, and then come to the center, and gone up there about ten or twelve feet; that is what he will have to do. He will have to get both flues high enough to get the circulation.

COL. WOODWARD: We notice that your out-take flues have small apertures at the ceiling.

MR. COOK: These openings should be full size of the flue, and are used when the room is too warm. It may be necessary to use them all of the time.

There does not seem to be much doubt but the circulation could be all taken out above if we could thereby control temperatures. Some experiments conducted in New York tend to show that the purest air is near the floor.

In order to be on safe ground, let me say, use the upper flue openings, except when the temperatures run low then close them.

PROF. VAN NORMAN: Will a six-inch wall do it?

MR. COOK: Usually, it would, yes.

MR. CLARK: Do you believe that putting up this ventilation inside of a barn would be better than to take it from the center of the building?

MR. COOK: I do not believe it will make any difference so far as the air in the room is concerned whether the out-take flue is in

the middle or on both sides, or on the end of the room, because we have the same thing that we have with a big stove. It won't make any difference with an old fashioned big, box stove, which end the pipe is on, if the draft is in the other end, and that is really what we are dealing with. We are dealing with a big box stove, practically so. Now if the air currents are proportioned properly around this room, they are bound to find this out-take flue up to a certain length.

MR. McHENRY: In running that up to the side, how much above do you want the flue to extend?

MR. COOK: How high is the barn?

MR. McHENRY: Say, thirty feet.

MR. COOK: There is nothing in the way anywhere, no big trees nor anything of that sort?

MR. McHENRY: No, nothing in the way.

MR. COOK: Four or five feet will be ample above the ridge of the barn.

MR. McHENRY: Will the same thing hold good with the chimney?

MR. COOK: Yes, the principle is the same, but the problem is a harder one.

MR. McHENRY: As I understand it, this flue will need go higher than a chimney would under the same circumstances.

MR. COOK: Yes, and put a cover over the top of the flue and don't interfere with the current of air.

PROF. VAN NORMAN: How about putting a double door at the top of your flue, connected with a rod, so that when the wind blows on it, it will be possible to regulate it?

MR. COOK: One of the nicest theories that was ever promulgated, but it don't work in practice. I know of several barns constructed like that. We want to let everything absolutely alone on top of this flue, and let nature take its course right across the top. I would not do anything, only just to be sure that the top of that flue is up in good fresh air, with a cap over it to keep the rain out, and the trouble is over.

A Member: Must that cap be put on rods?

MR. COOK: Yes, take some small pieces of iron and set it up with half inch iron. You can build this flue—I did in my own case above the ridge of galvanized iron, because it looked much better than boards.

MR. HERR: You have to have the cap upon it on the four sides, or the top sides?

MR. COOK: Have it open out at the sides, just set it up above the flue. Have it open all the way around and sustain it there with a half inch iron rods.

A Member: In Pennsylvania we sometimes have these old fashioned bank barns. I think I understood you to say that it don't make any difference where we put that, in the center or in the sides of the barn, the flues should be perfectly straight.

MR. COOK: Yes, the straight flue does two things in most barns. In the first place, it interferes with the hay track, and in the next place it interferes with something down below. We either drive through there or go through to feed our cows.

I will tell you how you can make an adjustable flue for a barn like that. Let the flue come down solid to a point where it won't strike your head, and from there down, build the flue enough smaller so that it will telescope into the flue above. You can raise it or lower it. You can take your circulation from the floor, take it half way up or take it clear up from the ceiling. You don't need insulation down in the stable because the temperature of the air on the outside is the same as the temperature of the air on the inside.

A Member: Why couldn't that flue be utilized as a hay chute?

MR. COOK: It can be if the fellow that feeds the cows will shut the door; it certainly can be, but I have never dared to advise it, because one will go up in the hay mow and throw the hay down, and forget to shut it, and the next morning you will come out, and find frost on the roof in a cold morning and something will happen to the hinge, and that will stop the circulation and you come out there in the morning and everything seems kind of stuffy. So all things considered, I have not advised it.

The SECRETARY: Well, it wouldn't be large enough, would it?

MR. COOK: Yes, it might be. I was in a barn yesterday where it was right to an inch. Ordinarily I would not do that; I would have a separate piece of machinery.

A Member: I built a new barn four or five years ago, and we have used the hay chute for ventilation of the basement. Whether it is right or not, I am not decided, but I know that we get good results. The hay chute don't come outside of the roof; it comes up within three feet of the roof of that barn. It is forty feet from the barn floor to the cone of the roof, and we throw the stuff down at one end for the cows and at the other end for the horses. We have used this barn; this is the sixth winter. There is room in there for twenty head of cattle and thirty head of horses, and it is full now, and I have failed to detect any odor at anytime in going into that barn. I had Mr. Agee with me last June and I felt a good deal complimented by what he said about that barn. He looked particularly after the ventilation, and asked about whether there was any dampness or anything of that kind. I told him I never saw anything of the kind. When he went away he said that I had the second best barn that he had ever been in. We built that barn ourselves; we didn't have any architect or anything about it. We had a big barn right on this same ground, and we knew where we were short in the other barn, and we kept that in mind from start to finish. Our cattle and horses are healthy; we have never had a sick animal for the last six years.

MR. COOK: I will be very frank with you, my friend. If I thought that anything you have said would counteract anything I have said, I should regret very much that I had ever come to Harrisburg. At the same time I do not question that the ventilation you have got in your barn is fairly good, but I beg of you, if you are going to do a thing, do it right. It is so much better that you get this fresh air from out doors. I do not want to debate this question with this gentleman who is a good deal older than I am, but I do not want you to take his view point and leave mine out.

The SECRETARY: Isn't it possible if the air cools, that it would come down and vitiate the hay?

MR. COOK: That might be rather farfetched, because the condensation would probably take place, if it took place at all, in the upper part of the barn.

The SECRETARY: Wouldn't it come down in being condensed?

A Member: It gets out at the roof, don't you worry about that.

MR. COOK: I have worked at this thing for six years, harder than I ever worked on anything before. Here in my friend's case, there is no doubt one of those exceptions that sometimes occur, but do not do it; run it out through the roof, and do it right.

MR. HERR: The out-take flue is always close to the floor.

MR. COOK: Close to the floor and close to the ceiling.

MR. HERR: Does that center flue that you talk about—would that come down to the floor?

MR. COOK: Yes, that would come down to the floor above the cows and it would take the place of these little openings you see in these flues, which of course are opened and closed at will. All we do in our own barn is to open and close these upper flues, as may be required.

A Member: They are warm weather flues?

MR. COOK: Yes, warm weather flues.

A Member: When you open these warm weather flues, is your ventilation just as good?

MR. COOK: Most certainly it is.

I remember a cold day when the wind had just changed to the south, and the atmosphere was full of moisture without any air currents forming at all outdoors, and it was hard to get any currents to rise upwards. That was the day we held our meeting in this barn. We had four hundred people, in addition to fifty cows, and yet we were able to maintain this sort of a pure atmosphere. That was a pretty trying time to maintain pure air. We are able to carry a temperature of between fifty and sixty degrees; when it gets up to sixty, we blow off some of this air. I might tell you that in making some of the tests and in watching them very carefully we had a period when the temperature ranged from freezing to twenty degrees below zero, and we were able to keep the temperature

within a range of six degrees. I say that ordinarily, with the care it gets, we will keep the temperature within a range of about ten degrees.

MR. HERR: Without any artificial heat?

MR. COOK: Without any artificial heat. Now that is not an expensive proposition. It was at my request that these people came to our place where we held this institute. Some of the people didn't believe all I said, and I had to take them there and prove that I was not lying, and if any of you think what I have stated is not correct, if you will come up and examine it for yourselves, if you don't find it practically as I have said, I will pay your fare.

DR. FUNK: Would that system of ventilation answer for a fruit room?

MR. COOK: I do not think it would. I spent two weeks, Doctor, in the State of Maine this Fall working along this line, and when I reached Aroostook, that famous potato section, nearly every man came to me to know if there was not something in this system that would help them out. They have a problem of a peculiar sort there; I could not see after studying it very carefully, how it could be applied for this reason, they do not need such a change of air as this would bring about. They simply want to get rid of the moisture and keep as cool as they can. Now without artificial heat to let in these currents of cold air, we would soon let in so much cold air, that we would have a freezing temperature inside. They are building these potato houses in a bank, and building walls with an air chamber, and putting in two or three windows, simply for the purpose of cold storage, and laying a loose plank floor above, so that they can go in and take that up anywhere and dump down their potatoes, and after they get through, they put on anywhere from two to four feet of straw, and that moisture works itself up through the cracks and I think that the men who have done that have got the ideal system for their potato houses.

The SECRETARY: Do not forget to tell us about the meeting.

MR. COOK: I have that right here. Now we did this work as a starter. You will see the one picture represents the people being talked to, and the other being fed, or as having been fed, and I want to say there wasn't anything left after they got through eating because we had more people than were expected. Mr. Dawley, our Institute Director, held this meeting to show farmers how cheaply sanitary barns could be built and maintained. We can build along this line cheaply as well as to build expensively. There is no reason why any man producing milk should keep dairy cows who cannot keep a stable along this line, and I believe, Dr. Tower, it would help you in your work, because it is a question of health to the animal, and system of ventilation is really the key to the whole thing.

Now, Mr. Chairman, I believe I have talked as long as it is proper, and I want to thank the people very courteously for the kindness shown me since I came here. I realize that when you get a body like this together, you have the pick of the great Commonwealth of Pennsylvania, the best men that the State affords, and in

fact we have had one ex-Governor and the present Governor with us to-day, and I suppose a whole lot of men who want to be Governors. I am not sure whether that is so or not, but I am glad that the time has come when the man on the farm can look with longing eyes and expectant eyes to these positions of responsibility and I have longed for the time to come when the farmer could say that he knew as much about his business as a professional man knows about his business. Again thanking you people and you, Mr. Chairman and Mr. Secretary, I bid you good-bye.

On motion, duly seconded, a unanimous vote of thanks was returned to Mr. Cook for his excellent addresses.

MR. COOK: Mr. Chairman, I would like just to say that I believe I have never talked on the question of ventilation to an audience that I feel now has a better understanding of it than this. I have talked to people who I thought knew, but when I got through, they didn't; but I think this audience knows.

The SECRETARY: I thank you for the compliment in what you have said.

PROF. VAN NORMAN: These Pennsylvania Dutch barns with big banks and standing walls, is it possible to provide methods of ventilation that will overcome the difficulties in their case?

MR. COOK: Here is a very good way indeed; to get the intake flues into these so-called bank barns.

MR. COOK: Take away the dirt down to a point at least three feet from the stable ceiling, put down a box or flue on the outside, cut an opening through the wall and connect the inside flue through the outside. These flues will have to be fifty per cent. larger than where the side of barn is exposed, because we lose the effect of wind pressure.

MR. VAN NORMAN: Take the air into the bottom in that case?

MR. COOK: Take it in just the same; turn around and carry the flue up there (indicating on diagram).

A Member: Wouldn't it do just as well to put it in at either end?

MR. COOK: It will do fairly well if the barn is not too long and the flue—the out-take flue is on that side of the barn.

Now there is this bank here, this side is banked the whole length, and we do not want to put an intake flue in there; it would be better if you did, but there is a way that you can get out of it; put the intake flue right in that corner (indicating on diagram). Now put the intake flue right there; don't that strike you? Then we have got air currents forming right along next to this wall that will prevent condensation.

The SECRETARY: But you must remember, Professor, that that bank is on the ends, too.

MR. COOK: Then on the ends, I would dig down there.

DEPUTY SECRETARY MARTIN: When you go down, you want to put in both light and ventilation. You can put both light and ventilation there by digging away there, can you not?

MR. COOK: If you want to go to work and dig away there, yes, I think that would be very much better; you did not suggest that idea. Let me give you another way, if you want to sit just a moment. It will often determine when you walk into a stable whether the intakes and out-takes are well-balanced. Sometimes when you open the door into a stable, you notice at once that the air rushes out because you have pretty nearly compressed air inside. In that case it is easy to see that the out-take flues, if they are in there, they are not doing their work, or the air would not rush out when you open the door. On the other hand, I have been in stables where you would have to go in two or three feet before you would begin to feel the change of temperature—say the change from the outside was twenty degrees, you would not feel that until you have got into the barn several feet, because there was not fresh air enough coming in to provide the out-take flues with what they were called on to carry out; I can tell the whole story the minute I step into the stable.

DEPUTY SECRETARY MARTIN: And you often see a little steam coming out.

MR. COOK: Yes, that is wrong, anyway.

MR. NELSON: I am sure we would all like to have a word from Mr. Martin.

DEPUTY SECRETARY MARTIN: Mr. Chairman and Friends: You have indeed enjoyed a very rare opportunity at this meeting of the State Board, for there is no question or any one subject which is of greater importance to the dairyman of Pennsylvania than the question of the construction of the barns in which you keep your animals. The question of the old fashioned Pennsylvania barn has been mentioned several times during the last session. What you need in these old Pennsylvania barns, above everything else, is light and ventilation. I would commend to your careful consideration the lesson which you have received from Mr. Cook this evening. It is simple; it is plain; it is in line with the natural laws governing ventilation; it appeals to our common sense in every line to which our minds have been called this evening, and as we are in the midway of our farmers' institute season, I wish to call the special attention of the men who are engaged in giving instruction in Pennsylvania, to the lessons we have received along this line. This has been one of your opportunities, to procure a knowledge of the most approved method of barn ventilation, and I compliment you upon that important point.

Time would not permit nor would it be discreet that we should go over, to any extent, the valuable lessons that have been developed during this meeting. I know they will accomplish good results in Pennsylvania. The field here in Pennsylvania is a broad one and an important one, and the gentlemen who have come to us from other states have let us into lines of thought that will no doubt be a benefit to us, and I want to join my voice with that of yours this evening in expressing our gratitude and thanks to these men from other states, equipped as those men have been with knowledge of a practical kind, who have brought to us such excellent instruction during the sessions of this meeting.

COL. WOODWARD: Mr. Chairman, I am very well aware that this morning there was a sort of an "omnibus" vote of thanks given to all those who were here. This has been a special audience and has been a special treat. I do not believe I should sleep very well to-night if I should go home without personally expressing my admiration for the clearness with which this very difficult problem has been presented to-night, and I am going to move that there should be a special vote of thanks at this time—on this occasion and at this time for the most interesting, clear and lucid way in which Mr. Cook has solved these problems for us.

The motion having been seconded, it was unanimously agreed to.

DEPUTY SECRETARY MARTIN: Mr. Chairman, will you just permit a word before we adjourn. My mind was so absorbed with the excellent lesson to which we have listened to-night, that it drove out at the time, one other thought that was impressed upon me during this meeting, that your worthy Secretary of the Board and also Secretary of Agriculture, along with the members of the State Board of Pennsylvania, who are the county chairmen of institutes, are men qualified to present such papers of such a high order as have been presented at this meeting. Now I am proud of that, because I come in contact with these men steadily the year round, and if they were not present, there are some things that we would say that we will leave unsaid this evening.

MR. HERR: I move that when we adjourn, it be to meet subject to the call of the Secretary of Agriculture.

The motion having been duly seconded, it was agreed to.

The SECRETARY: I want to say that I have been so busy as not to be able to get around and know about your vouchers, but they will all be sent to you and you will receive the payment for your expenses very promptly.

MR. McHENRY: Mr. Chairman, it is a rule, I believe, always to keep the best for the last, and I would like to hear from our worthy Secretary before we leave here.

The SECRETARY: Mr. Chairman, it seems to me that we have had enough. I do not see how I can add anything to what has been said during this very excellent meeting, but I am certainly very much pleased indeed with the unusually large attendance and the interest that has been manifested during the sessions. I might say that in the preparation of the program, the thought that was in my mind was, to bring before you something that would be of most interest just at this time; subjects that are timely. The reason that we have had so much upon the live stock question, is because I have noticed, as I think you have all noticed, that there is an increasing interest all over this country in this question. There has been a very great advance made in the last two or three years, not only by our own State but by the whole country.

You may have observed that during the year just closed, that the amount of stock which was sold at the city of Chicago—and that may be regarded as a fair index of what is going on in the country, because that is the center of the live stock business—was about thirty-six and a half millions of dollars more in value than it did the year previous, and this was what brought me to consider that it was im-

portant for us to make this a special feature of this meeting; and so in looking around for men who could give us some information along these lines, my thought was directed toward Professor Shaw of Minnesota, knowing that he could tell us how to breed the stock, select the stock and feed the stock. Then the next thought was, I wanted somebody to tell us how to house the stock and take care of its health, and so I succeeded, and I was very glad—I have been especially glad since we have been together—that I was successful in getting these men to come here.

Now, I know that this meeting has been an inspiration to me, I know that I shall take up the regular routine work of the Department quite a good deal refreshed because I have had an opportunity of seeing you here, and because of the enthusiasm, the earnestness, and the intense interest that has been caused by the work that has been done, and because of the most excellent reports that have come from our standing committees and because of the character of the instruction that we have received from the gentlemen who have favored us with their presence from other states.

MR. BLYHOLDER: Mr. Chairman, we certainly have been gratified and have been instructed to a greater extent than we have ever been at any former meeting that I have ever attended. We have had, I think, one of the best meetings that we have ever had, and I think that we appreciate all that we have heard and have received.

We have given thanks to these gentlemen for the excellent work that has been done, but it seems to me that there is one thing that we have been pretty nearly forgetful of, and that is this: It has just been brought to our attention that somebody has been responsible for all this good work that has been done, somebody has been instrumental in affording us this excellent program, and that person is our worthy Secretary, who has prepared this feast for us and has delivered it to us, and I, therefore, move you, Mr. Chairman, that we, as a Board, extend to him our most hearty thanks for the able manner in which he has prepared and had this meeting conducted.

MR. McHENRY: Mr. Chairman, I second that motion and heartily support it; we were not forgetting it, we were only leaving the good things off for the last moment, that was all.

MR. BLYHOLDER: Mr. Chairman, I hope that the motion will be passed by a rising vote.

The question being put, the motion was unanimously agreed to, by a rising vote of all present.

MR. McCLELLAN: Mr. Chairman, I move that we do now adjourn.

MR. HERR: Mr. Chairman, I second the motion.

The question being, shall the motion prevail?

It was agreed to, whereupon the meeting adjourned, subject to the call of the Secretary of Agriculture.

N. B. CRITCHFIELD,
Secretary.

